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Problems of Economics

Selected Articles from Soviet Economics Journals in English Translation

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PROBLEMS OF ECONOMICS

Selected Articles from Soviet Economics

Journals in English Translation

PROBLEMS OF ECONOMICS is a complete, literal translation, without editorial comment, of articles selected from the following Soviet publications:

VESTNIK LENINGRADSKOGO UNIVERSITETA, SERIIA EKONOMIKI –
JOURNAL OF LENINGRAD UNIVERSITY, ECONOMIC SERIES
VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIIA EKONOMIKI –
JOURNAL OF MOSCOW UNIVERSITY, ECONOMIC SERIES
VESTNIK STATISTIKI – JOURNAL OF STATISTICS
VNESHNIAIA TORGOVLIA – FOREIGN TRADE
VOPROSY EKONOMIKI – PROBLEMS OF ECONOMICS
MIROVAIA EKONOMIKA I MEZHDUNARODNYE OTNOSHENIIA –
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NAUCHNYE DOKLADY VYSSHEI SHKOLY – EKONOMICHESKIE
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PLANOVOE KHOZIAISTVO – PLANNED ECONOMY
EKONOMICHESKAIA GAZETA – ECONOMIC GAZETTE
SOTSIALISTICHESKII TRUD – SOCIALIST LABOR

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SOVIET AGRICULTURE

Vestnik Statistiki, No. 2, 1961

BRAGINSKII AND D. DUMNOV:

Labor Productivity in Agriculture in the USSR and the USA

In the economic competition between the USSR and the leading capitalist countries — the United States of America in the first place — the competition in labor productivity is of primary importance. A growth in labor productivity is the main factor solving the fundamental economic task of the USSR, which is to catch up with and overtake the most advanced capitalist countries in per capita output. It would be incorrect, however, to equate the basic economic task with that of catching up with and overtaking the principal capitalist countries in labor productivity, as some economists are doing. The Soviet Union may be able to catch up with and overtake the USA in per capita output earlier than labor productivity.

It will take the USSR a few more years to reach the USA level of total agricultural output. In 1958 and 1959 the total agricultural output of the USSR was 75 to 80% of the American figure expressed in identical money terms. In the output of a number of products the USSR has already either overtaken the USA or come close to it. We may remind the reader that the USSR is ahead of the USA in the production of wheat, potatoes, milk, wool and sugar beet (including sugar cane in the USA figure). The USSR produces large quantities of flax fiber, sunflower-seed and some other plant products which the USA does not produce at all or produces in negligible quantities. The USSR is still behind the USA in the production of meat, eggs, cotton, vegetables, fruits and forage crops. But in 1965 this country will be producing about as much grain and meat of all kinds as the USA produces at present, while nearly doubling the present milk output of the USA. The USSR will also register gains in other farm products. In all, agricultural production in the USSR in 1965 will be 1.7 times the 1958 level and some 140% of the present American level. Fulfillment of the Seven-Year Plan will raise the per capita output of farm produce in the USSR above the present American level.

In analyzing the present position and the prospects of economic competition between the USSR and the USA in agriculture, we must not forget that

although in scale, multiplicity of crops, and diversity of soil and climatic conditions, agriculture in the USA is most closely comparable to our own, nonetheless climatic conditions in the USA are immeasurably more favorable to agriculture than in the USSR. This must be remembered in comparing labor productivity in Soviet and American agriculture. First of all, however, we must briefly analyze the social and economic conditions under which the productive forces in American agriculture have developed.

As a result of specific historical circumstances, labor productivity in American agriculture far exceeded that of all European countries for many decades, let alone that of economically backward pre-revolutionary Russia. Agriculture in the USA developed in newly settled regions, without feudal survivals, and under conditions of a relative abundance of land, low prices and a shortage of labor. All this stimulated the use of machinery and economical methods of farming, particularly livestock farming.

Thanks to favorable climatic conditions and an abundance of highly fertile land, the American farmer used relatively little fertilizer and received a much greater return per unit of labor than the peasant of France, Germany, Italy or Britain, where the survivals of feudalism and serfdom made themselves felt. In Russia these survivals greatly hampered the development of productive forces in agriculture. Labor productivity in farming was particularly low. Before the Revolution (in 1913) 75% of the gainfully employed population of Russia worked in agriculture; in the USA in 1910 only a little over 30% of the gainfully employed population worked in agriculture and produced a much higher level of output.

As we know, the growth of labor productivity in capitalist agriculture is a deeply antagonistic process. Higher labor productivity on the big farms brings ruin to the mass of small farmers. Between 1910 and 1959 average labor productivity in American farming almost tripled. This increase led to the impoverishment and pauperization of many

hundreds of thousands of farm families. Between 1945 and 1958 alone the number of farms in the USA dropped from 6 million to 4.7 million and the farm population from 25.3 million to 21.4 million. (1) The increase in labor productivity on American farms is being effected more and more through back-breaking intensification of labor. The working day on American farms is very long and the output quotas exceedingly high, and farm owners use only physically strong and experienced persons as farm laborers, dooming the less capable and older workers to chronic unemployment.

Constant fear of unemployment and ruin forces the hired laborers and small farmers to work beyond their strength. But the increase in labor productivity benefits only the monopolies and capitalist farmers.

An entirely different situation exists in the USSR. The growth of labor productivity in Soviet agriculture leads to substantial increases in living standards both in the city and the countryside. Between 1940 and 1959 labor productivity in the socialized economy of the collective farms registered a 77% increase. During the same period the average real incomes of the peasants increased 2.2 times (calculated per working person). In 1965 labor productivity on the collective farms should be about twice the 1958 level, with at least a 40% rise in collective farmers' real incomes.

The advantages of the planned socialist economy make for a steady and rapid growth of labor productivity in all branches, including agriculture. But at present the USSR is still considerably behind the United States in agricultural labor productivity. However the lag is less pronounced than the enemies of socialism would have us believe. Bourgeois statisticians and economists, in comparing labor productivity in the USSR and in the capitalist countries, resort to falsification and often use obviously absurd figures. Thus, the report of the Joint Economic Committee of the United States Congress, A Comparison of the Economic Growth of the Soviet Union and the United States, makes the claim that labor productivity in American farming is between 8 and 12 times the Soviet level. The same figure is repeated by Fortune magazine and other journals. An analysis of statistical data on agriculture in the USSR and the USA shows that these figures have nothing in common with the facts.

For the real dimension of the lag to be determined, the indexes of labor productivity in the USSR and USA must be placed on a fully comparable basis. This requires comparable data on output, employment and labor time expenditure. We have already referred to the level of output in agriculture. As for the number of persons employed in American

farming and the number of man-hours worked, the US statistical data are understated and not quite comparable with similar data in Soviet statistics. American farmers keep records of their personal labor and paid labor only, but do not record much of the work performed by their families. A sizeable part of the work done by other workers in agriculture is also not recorded.

Let us first consider the data on agricultural employment. The figures for the USSR and USA cannot be mechanically compared. The fundamental differences in the social and economic structure of agriculture in the USSR and USA lead to substantial differences in employment. American farmers operate on a capitalist basis, under conditions of competition and the ruthless exploitation of labor. In the USSR, on the other hand, agriculture is run along socialist lines. All the collective farmers are equal participants in the *artel*. But they do not all work the same number of hours, of course: the elderly folk, the youngsters, and women having large families work limited hours, to the extent of their possibilities. Apart from farming operations the collective and state farms do a great deal of building work and have subsidiary establishments as well as welfare and children's institutions. For these reasons, Soviet agriculture will inevitably employ more people than in the USA, even when the labor expenditure per unit of output in the USSR drops below the American standard.

Because of the seasonal nature of agriculture, farm employment varies with the seasons. It is highest when the major crops are being harvested and it is at this time that the employment figures are most fully recorded. Let us compare the agricultural employment figures in the USSR and USA during the height of the farming season (September in the USA, July and August in the USSR) and in terms of average annual figures. According to current American statistics, the average number of people working on American farms in September 1958 and 1959 was 9.3 million. (2) On an average annual basis employment in US agriculture in 1958 was 7.5 million. (3)

The data of various US official sources on farm employment differ considerably. (4) Without going into the causes of these discrepancies, we shall merely note that all sources admit the possibility of an appreciable understatement of the number of people employed on farms, both at any given time and on an average yearly basis (including the period of highest employment in agriculture). This applies in the first place to the unpaid members of farm families. But it also applies to the number of hired workers.

American statisticians exclude from the farm

employment figures those able-bodied and juvenile members of farmers' families who worked less than 15 hours during the week recorded. Hence, if the unemployed members of farmers' families worked even 50 or 60 hours a month or 7-8 normal working days they would not appear in the agricultural employment statistics.

According to the Statistical Abstract for 1959 (p. 10) there were five million able-bodied women living on American farms in 1956. But according to the Monthly Labor Review only 1.9 million women worked on farms in September 1956. (5) We are thus led to believe that 3.1 million able-bodied women did not do any work at all. This is a distortion of the facts. In reality, during the height of the season on farms which do not employ hired labor (and they are in the majority), women work in the garden, look after the cattle and poultry, etc. (6) The statistics also ignore the work of children below 14 who are employed less than 15 hours a week, while the Census Bureau keeps no record of the work of children of this age employed even more than 15 hours a week. This means that the number of persons — members of farmers' families — who are employed in farm work but are not included in the American statistics is at least 2 or 3 million, according to our estimates. They are for the most part women and children working less than 15 hours a week. In the Soviet Union the collective farms' annual reports on employment by months cover both the able-bodied men and women and all those children and old people who in any way participate in farm work. Hence, for the purpose of comparability the American farm employment figures should be increased by some 2 to 2.5 million in terms of the yearly average, and by 3 million during the period of highest employment. The current US statistics which are used as a basis for calculating employment figures also considerably underestimate the number of hired farm workers. This is particularly true of seasonal workers, especially of the migratory, juvenile and ported workers (Mexicans, Puerto Ricans, and others). About 500,000 workers in the USA keep wandering with their families in search of work. (7) The seasonal workers have only part-time employment and are really semi-employed workers. During the harvest season more than 4 million hired laborers work on the farms, according to Department of Labor figures.

That the statistics on hired workers are incomplete may be seen from the figures for 1950. Current statistics set the number of hired workers and office employees in American agriculture at 2.3 million, while the Department of Agriculture figure is 5.5 million, a difference of more than 3 million. More recent figures on hired workers also vary

widely depending on the source. Thus, according to the Handbook of Basic Economic Statistics, in July-September 1958, i.e., at the height of the farming season, there were 3 million hired workers employed on American farms, (8) but Agricultural Statistics placed the number of hired workers in 1958 at 4.2 million, with 2 million as the yearly average. (9)

It should also be noted that the number of persons who worked on American farms in any single month is recorded in accordance with the figures for the last week of the month, so that those who worked during the previous weeks but not the last one may not be accounted for. In the Soviet collective and state farms the records are complete, and anyone who has worked even a single day during the month is accounted for.

Finally, for the Soviet and American data to be comparable, those persons on American farms who provide them with services and help to dispose of their produce should be registered as employed. The point is that in the USSR these operations are for the most part performed on the collective and state farms directly and the persons performing them are classed as agricultural workers (according to the summary annual report of the state farms for 1958, the sale and procurement of products and materials accounted for 7% of total labor expenditures), while in the USA these functions are performed by special enterprises and agencies whose employees are not classed as agricultural workers. The services rendered to farms include such operations as repair of tractors and farm machinery, production and marketing of fodder, processing, drying and cleaning of grain at the elevators, processing of mineral fertilizers, transportation of grain, milk and other farm produce, etc. Most of these operations are performed by commercial and transport companies. In 1958 some 800,000 persons were employed in these operations in the USA.

If we take all these adjustments into account and bring the number of persons employed in farming in the USA into a pattern comparable with that used in the USSR, we will find that in 1958 and 1959 some 12 million persons worked on American farms, the number rising to 14-14.5 million during the height of the season.

What are the respective figures for the USSR? In terms of average yearly employment throughout Soviet agriculture, including the collective farms, the RTS, MTS, state farms, state subsidiary agricultural enterprises, as well as the personal subsidiary farm plots of the collective farmers, factory and office workers, a total of 33 million people were employed in 1959, including not only the able-bodied but children and elderly people.

As for the peak season the number of people employed is determined as follows. A record of employment by months is kept only on the collective farms and state agricultural enterprises. In July 1959, 30.7 million persons worked on the collective farms (including children), this figure including those who worked in the socialized economy even one day a month. From this figure, however, there should be excluded 4 million persons employed in non-agricultural occupations. Hence, during the peak season the number of people employed in collective farming directly was 26.7 million. During the same period the state farms and subsidiary state agricultural enterprises employed 6 million people on similar jobs. If we add the RTS workers and take into account the work done by the collective farmers and state farm workers on their personal subsidiary farm plots, the total number of persons employed in Soviet agriculture at the height of the season will be approximately 38 million.

On the basis of these data, agricultural employment in the USSR and the USA will appear as follows (the figures apply to 1958 for the USA and 1959 for the USSR):

	USSR	USA	Excess of USSR over USA
During the peak season, in millions	38	14	2.71 times
On an average annual basis, in millions	33	12	2.75 times

Thus, during the period of maximum employment, and on an average yearly basis, 2.7 times as many persons worked in farming in the USSR as in the USA. The total agricultural output of the USSR in 1959 was some 20% below that of the USA in 1958. Hence, labor productivity in Soviet agriculture is about one third of the American level.

Let us also compare labor productivity in Soviet and American agriculture on the basis of output per man-hour.

The data on labor inputs in man-hours contained in the American statistics are not actual inputs but norms, i.e., they reflect as a rule the labor requirements of big farms. According to these figures, American agricultural operations in 1958 required 13.7 billion man-hours. A footnote to the table in the *Statistical Abstract* from which this figure has been taken says that this is the standard number of hours required by male workers of average skill to

perform various jobs. Hence, the actual number man-hours spent by all workers, without their being re-calculated in terms of hours of skilled male workers, is much greater than would appear from the American sources.

According to Hecht and Barton, (10) the average length of the American farmers' working day in 1946-1947 was 12 hours in summer and 10 hours in winter. The authors point out that nothing had substantially changed in this respect in 30 years. Nor has there been any substantial change in succeeding years. (11)

If we consider that the bulk of farmers work all the year round, we find that farmers themselves, without hired workers and those members of the family who help them, actually worked some 14-15 billion man-hours in 1958, i.e., more than the standard number of hours cited above. To this should be added the labor of hired workers amounting to some 5 billion man-hours, (12) as well as the work of those members of farmers' families who work less than 15 hours a week and who are not taken into account by American statistics at all. Their work adds up to at least a billion hours even if they work only one or one and a half hours a day on the average.

According to our calculations the actual labor puts on all American farms, including the small ones, are about one and a half times as large as standard expenditures of skilled male labor, as calculated by American statistics for big specialized farms.

If we calculate the total yearly inputs of labor man-hours in Soviet farming (including the subsidiary personal plots) for the range of operations comparable to those performed on American farms we will again find a difference of some 2.8 times in favor of the USA. Hence, labor productivity in Soviet agriculture on a man-hour basis in 1958 was about one third of the American level, i.e., we arrive at the same figure as before.

Unfortunately, some Soviet economists mechanically compare Soviet data with the incommensurate official American statistics on employment, labor inputs and output in agriculture. Ignoring the marked difference in accounting methods and the consequent incomparability of much of the data, they essentially repeat the totally incorrect conclusions of bourgeois economists on the lag in labor productivity in the USSR as compared with the USA. T. A. Aganbegian alleges that labor productivity in 1957 in Soviet agriculture as a whole was four to five times lower than in the USA. (13) The only justification for this allegation is the claim that in 1957 between 30 and 40 million people were employed in agriculture in the USSR and only 6 to

tion in the USA. But such very vague and indefinite data are likely to lead to the most varied conclusions (depending on whether the actual figure is nearer to the bottom or top limit calculated by the norm).

of great practical significance is the comparison of expenditures per unit of output of the most important agricultural products on the collective and state farms of the USSR and the big farms of the USA. It is well known that the official American statistics on this subject are not factual but represent norms. The norms are determined on the basis of a sample study of some 4,000 big farms with a high level of mechanization, high yields and a high livestock productivity. These farms represent less than 1% of the total number of farms in the country. A study of agricultural experimental stations are also taken into account here.

The actual average inputs of labor per unit of output on American farms as a whole far exceed the official American figures. This is shown even by the fact that according to the norms mentioned above the total agricultural output of the USA in 1958 could have required 13.7 billion man-hours, while actual labor inputs were about 50% higher. Labor inputs per hectare, per head of cattle and per unit of output on small and even medium-sized farms are greater than on the bigger farms. This stems from the fact that the small farms use much less machinery and their crop yields and livestock productivity are between 1.5 and 2 times lower than those of the big farms. In Indiana, for instance, in 1950 the production of a centner of pork on farms with 10 and more pigs required 42% less labor than on farms with 1 to 4 pigs. In the Pacific states, where 57% of the milk cows were concentrated on farms with more than 20 heads each, the milk yield per man-hour was almost twice as high as on the farms of the Central South-West, where only 13% of the herd was to be found on farms with more than 20 milk cows each. Average labor inputs on all farms are at least 50% higher than those given in the official American statistics.

An indirect indication of the enormous disparity in labor productivity on the big and small farms is provided by the data on the relationship between employment and marketable output. According to the 1950 census, 47% of those employed on farms worked on small and very small farms but produced only 17% of the total marketable produce. This means that nearly one half of the farm population had a labor productivity far below the average. J. Wheeler reports that the share croppers of the South and the tenant farmers in other parts of the country still employ primitive methods used a century ago. (14)

In the Soviet Union, labor inputs per centner of

produce are calculated not on the basis of sample studies of the best farms but on the basis of a mass of information on the collective and state farms of the country as a whole. These data are not indexes based on estimated norms but factual data computed on the basis of the annual reports of the collective and state farms. Because of deficiencies in labor accounting methods the data on labor inputs are exaggerated as compared with actual inputs. This stems from the fact that by a workday unit on the collective farms is meant the so-called report-for-workday, regardless of the number of hours actually worked. To a certain extent this also applies to the state farms. Observations made at numerous collective farms show that the length of the entire working day (including walking time from job to job and idle time) is 6 to 7 hours in winter and 8 to 9 hours in summer, net working time being about 20% less. According to data of the Soviet agricultural economist A. Teriaeva, the average working day on collective farms is between 7 and 8 hours. (15)

Hence the working day in American agriculture is at least 20 to 25% longer than in the Soviet Union.

The great disparity between the actual inputs of labor per unit of output and those indicated in the norms should also be considered. Actual inputs are greater than the norms, sometimes much greater. Hence, if we were to calculate labor inputs per centner of grain in the USSR according to the method used in the USA, the difference between labor inputs per unit of output in the USSR and the USA would appear much smaller.

Further, all data on labor inputs per unit of agricultural output in American statistics are given in terms of male labor. Consequently, in comparing the Soviet data with those of the USA the former should also be recalculated in terms of the labor of an able-bodied man. For coefficients, use could be made of the ratio between the average daily number of workday units earned by able-bodied men taken as the base, and the workday units earned by able-bodied women, old people and children. On the basis of the inquiry into collective farmers' budgets made in 1956-1958 the correction should be at least 12%.

Taking all these facts into consideration, the disparity between labor inputs per centner of grain in the USSR and in the USA will be much smaller than would appear from the figures on labor inputs as published at present. Despite all this, however, the disparity is still quite large. Our lag behind the USA is most pronounced in the production of meat. In raw cotton, milk and state farm production of grain the gap is much narrower. On the whole, however, if we compare total labor inputs for basic farm products in the USSR and the USA, the

difference will be close to the figures given above, calculated on the basis of gross output per worker and per man-hour.

Natural and climatic conditions have an enormous influence on labor productivity in agriculture. As already noted, the Soviet Union as a whole has much less favorable conditions than the USA, (16) and it takes a much greater expenditure of effort on the average to produce a unit of output in the USSR than in the USA. It would therefore be more to the point to compare labor inputs not between the USSR as a whole and the USA as a whole, but by separate regions with more or less identical natural and climatic conditions. Thus, in grain crops the regions most closely resembling the USA are the Ukrainian SSR (the steppe areas), the North Caucasus, Kazakhstan and Western Siberia. In these regions the labor inputs per centner of grain on collective farms in 1956-1958 were lower than the average for the USSR as a whole: in the North Caucasus — 2.1 times, in Western Siberia — 2.4 times, in Kazakhstan — 3.2 times.

The differences in agricultural labor productivity between the USSR and USA is decisively influenced by the differing levels of mechanization and electrification of agriculture in the two countries. Livestock breeding and some branches of crop production in the USSR are less mechanized than in the USA. In 1958 the USA had 5,180,000 tractors (including orchard and garden tractors) and the USSR only 1,001,000, or 1,750,000 in terms of 15 h.p. units; the number of grain harvesting combines in the two countries was 1.1 million and 0.5 million, and of trucks — 2.9 million and 0.7 million respectively. (17) True, on Soviet farms the machinery is used more intensively than on the capitalist farms of America, and the average output per tractor h.p., foot of combine width and truck tonnage is higher.

The advantages of large-scale socialist agriculture enable the Soviet Union to complete the all-round and integrated mechanization of all farm operations with a smaller number of tractors, combines and other machines per 100 hectares than are used in the USA.

In recent years many of the more efficient state and collective farms have substantially reduced labor inputs per unit of output. The measures taken to secure a sharp expansion in agriculture on the basis of Party and government decisions, have created opportunities for a rapid growth of agricultural labor productivity. Thus, while the big American farms require one man-hour to produce a centner of grain (exclusive of processing time), some of the state farms in 1956-1959 required less than one man-hour to produce a centner of grain. In 1956-1958 it took only 0.5 man-hours (including processing

time) to produce a centner of grain at the Kirov State Grain Farm, Akmelinsk Region, 0.54 man-hours at the Gigant State Farm, Rostov Region, 0.5 man-hours at the Stavropolskii State Farm, Stavropol Territory, and at the Kropotkinski State Farm, Krasnodar Territory, and so on. There are quite a few state farms in Kazakhstan and Western Siberia where production per man has in recent years exceeded 1,000 centners which is considerably more than on the big grain farms of the Central North-West in the USA.

A mass movement for the organization of all-round mechanization brigades on row crops (corn, cotton, sunflower seeds, sugar beets) developed on the collective and state farms in 1957-1960. These groups require much less labor than the average for the collective farms as a whole to produce a centner of produce, and less than is required in the USA.

In livestock breeding we must apply the economical methods used by the big American farms to maintain productive stock if production costs per centner of output are to be reduced further. We are referring to the loose housing system for dairy cattle and pigs, the use of automatic feeders, etc. The Peremoga State Farm, Zaporozhye Region, the Piatigorskii State Farm, Stavropol Territory, the Provalskii State Farm, Lugansk Region, all of which have adopted the loose housing system for cows, required 3.5 man-hours in 1958 to produce a centner of milk, 20% less than on the big American farms. On the mechanized dairy farms, where one milkmaid tends 35 to 50 cows, it does not take more than two hours to produce a centner of milk. On the number of pig-fattening state farms employing modern methods of tending pigs, less labor is required to gain a centner of increased weight than in the USA. Pig-tenders Ragulina and Strigunovskaia of the Kommunar State Farm, Stavropol Territory, required only two man-hours to gain a centner of increased weight in 1959; the same applies to other pig-tenders who fattened between 1,000 and 2,000 pigs a year. In 1960 there were more than 1,000 pig-tenders in the RSFSR fattening 1,500 and more pigs a year each.

Our collective and state farms have great opportunities for rapidly increasing labor productivity in the near future. This is especially true of livestock breeding, where we are considerably behind the USA in labor productivity.

Addressing the Des Moines Chamber of Commerce in September 1959, N. S. Khrushchev said: "Our agriculture's lag in mechanization and labor productivity compared with yours is temporary, of course. The socialist system of agriculture makes it possible to overcome this lag quickly and to secure a higher labor productivity than exists on your farms."

The decisions of the January 1961 Plenum of the Party Central Committee mark a new stage in the development of socialist agriculture. The increase in capital investments above those provided for in the target figures of the Seven-Year Plan and the additional extension, on this basis, of the technical and power resources of agriculture, will make for the acceleration of the process of all-round mechanization of agriculture and, consequently, of the rate of growth of labor productivity as well. More capital will be invested in irrigation, in new virgin soil cultivation, in production of fertilizers and their supply to the farms, all of which should result in a significant increase in crop yields and, therefore, in labor productivity.

The rate of growth of labor productivity will also be stimulated by a substantial cut in the prices of the means of production supplied to agriculture, by tax reductions and cheaper credit. All these measures will enable the collective and state farms to cut production costs, increase earnings, and strengthen the material incentives of collective farmers and state farm workers to increase output and labor productivity.

Implementation of the historic decisions of the January 1961 Plenum of the Party Central Committee will bring about a new upsurge of the productive forces in agriculture and enable our country in the shortest possible time to exceed the highest achievements of capitalism in the productivity of agricultural labor.

Footnotes

- (1) Statistical Abstract of USA, 1960, p. 615.
- (2) Handbook of Basic Economic Statistics, 1960, No. 4, p. 65.
- (3) *ibid.*
- (4) A detailed analysis of US farm employment statistics is given in Statistika sel'skogo khoziaistva kapitalisticheskikh stranakh, a collection of articles translated from English and edited by L. M. Myrlin. Gosstatizdat, 1960, pp. 4-5, 136-144.
- (5) Monthly Labor Review, No. 1, 1957.
- (6) The former US Secretary of Labor, Mitchell, in his Farm Labor Fact Book (1959), writes that men and children work on the farms in winter, spending "a little time" feeding the cattle and poultry and collecting eggs. As the seasonal demand for labor grows, adds Mitchell, they may spend as much as 40 hours a week and more on farm work.

(7) These data were taken from an article in the American Federationist republished by the Soviet magazine Za Rubezhom, 1960, No. 18.

(8) The Handbook of Basic Economic Statistics, 1960, p. 65.

(9) Agricultural Statistics, 1959, p. 452.

(10) Voprosy proizvoditel'nosti truda v sel'skom khoziaistve SShA, Selkhozgiz, 1957, p. 141.

(11) Mitchell, the former US Secretary of Labor, in his Farm Labor Fact Book mentioned above (1959), cites data on the number of working hours per week spent by people whose basic occupation is farming. In 1952-1957 the average was 48 hours a week (p. 179) or 2,500 hours per year. This figure applies to farming as a whole, but on the big farms the working week exceeds 60 hours. Mitchell cites numerous instances of a 60 to 70 hour working week on livestock farms.

(12) This figure has been calculated as follows: according to the Statistical Abstract (1958, p. 442), hired workers were paid 2.9 billion dollars in 1957; if we divide this sum into the daily wages of a hired laborer and multiply the result by the number of working hours per day — 8.8 — (see Statistical Abstract, 1958, p. 215), we get about 5 billion, which is the number of man-hours worked by hired laborers in 1957.

It is also necessary to bear in mind that the farmers have to pay for the hire and repair of machinery. In 1955, for instance, these expenditures amounted to 2 billion dollars (*ibid.*, p. 637). In paying for machine repairs (about 1.5 billion dollars) the farmer pays for the labor spent on repairs. Let us recall that in Soviet agriculture the cost of machine repairs is included in agricultural expenditures.

(13) See Sotsialisticheski Trud, 1959, No. 4, p. 19.

(14) J. Wheeler, Razvitie sel'skogo khoziaistva SShA i ego problemy, Foreign Literature Publishers, Moscow, 1954, p. 96.

(15) See Voprosy Ekonomiki, 1959, No. 1, p. 109.

(16) See the article by A. Pavlov and V. Sobakin-skikh "A Comparison of Soviet and US Levels of Agricultural Output," Vestnik Statistiki, 1961, No. 1. [See Problems of Economics, April 1961 — editor.]

(17) See the Statistical Yearbook Narodnoe khoziaistvo SSSR v 1959 godu, p. 416; the magazine Mirovaia Ekonomika i Mezhdunarodnye Otnosheniia, 1959, No. 9, pp. 41-45.

N. LAGUTIN:

Relative Indices of Growth in Soviet Industry and Agriculture

Establishment of proper proportions is a vital feature of national economic planning. In planning — for a given period — the necessary rate of growth in all branches of the national economy and the correct proportions of their development on the basis of the preferential expansion of Department I, the Communist Party and Soviet Government are guided by the basic principles of the Marxist-Leninist theory of reproduction and take strict account of the requirements of the objective laws governing the socialist economy — in the first place the law of balanced, proportional development of the national economy. In planning proportions it is absolutely necessary to find the optimum relationships at that given stage which secure simultaneously a high rate of economic growth and rising living standards for the working people.

In order to achieve the highest rate of reproduction of the gross national product and national income under existing circumstances, and to ensure the necessary proportions in the development of the entire national economy, it is essential to establish correct relationships between accumulation and consumption, between production of producers' goods and consumer goods and, what is equally important, between industry and agriculture. Balanced socialist reproduction is impossible unless the necessary proportions are established between industry and agriculture.

One may say without exaggeration that establishment of correct proportions between the development of industry and agriculture is one of the basic problems in national economic planning. This stems from the fact that these two principal branches of material production are closely interconnected. Industry supplies agriculture with machines and implements (tractors, combines, trucks, ploughs, seed-drills, etc.), equipment, fuel, mineral fertilizers, and in the past few years even mixed feeds and seeds. Agriculture, in turn, supplies industry — principally the food and light industries — with raw materials for the manufacture of consumer goods and provides food products for the population.

Constant economic ties between industry and agriculture are an objectively necessary condition for reproduction. However, although the growth of industry and agriculture are interdependent and they influence and condition each other, in relation to

agriculture industry plays the leading role. The establishment and consolidation of the material and technical foundation of agriculture depends on the growth of industry, especially heavy industry, for this is the key factor in the rise of the whole national economy. That is why the proportions established between industry and agriculture must, on one hand, secure priority to the former — primarily to heavy industry, which forms the basis of the national economy — and on the other hand, must provide for the growth of collective farm and state farm production to meet the food requirements of the population and the raw material requirements of industry. Since correct proportions between industry and agriculture are essential to a balanced development of the whole national economy, they are a vital factor in strengthening the alliance between the working class and the peasantry. The question of the alliance between the working class and peasantry has been and remains a paramount problem in the building of communism. That is why the Communist Party attaches great importance to the observance of correct proportions in industrial and agricultural development. In the past few years the Communist Party has taken a series of important measures to achieve a sharp rise in agricultural production and to coordinate this with the growth of socialist industry.

The preparation of a program for the rise of agricultural production, the elimination of its lag in relation to the growth of industry and the state's requirements for farm products — all this is part of the tremendous efforts of the Party and government to maintain proper proportions in the national economy. It shows that a socialist society is capable of consciously observing the necessary proportions in social reproduction on the basis of the laws governing its economy. Lenin saw this as the essential characteristic of a planned economy: "Continuous and deliberately maintained proportions would in fact amount to balanced planning." (1)

The figures shown in the table on the following page indicate that in the past few years the gap between the rates of growth of industry and agriculture has been substantially narrowed, the relationship between the development of industry and agriculture has improved, and this has created the necessary conditions for their future balanced growth.

	1953	1958	1953 in % of 1948	1958 in % of 1953	Average annual rates of growth of production	
					1949-1953	1954-1958
Gross industrial production (in billion rubles)	860	1,470	214	171	16.4	11.3
Gross agricultural production (in billion rubles in comparable 1956 prices)	313	472	107	151	1.4	8.6

No capitalist country has ever attained such high rates of expanded agricultural reproduction. In the USA, for example, the average annual rate of growth of farm output for the period covering 1954 to 1958 has been less than 2%. High rates of agricultural growth in the USSR will enable it within a short time to equal and exceed the most advanced capitalist countries — including the United States — in per capita output of farm produce.

In analyzing the relationship between industry and agriculture, in addition to data on the relative rates of growth of the gross output of these two branches in the economy, use is generally made of figures characterizing the share of each branch in the aggregate output of both. An analysis of the structure of the aggregate product of industry and agriculture of definite interest. The figures characterizing the share of each branch are one of the indices of the level of the country's industrialization. But such data — whether for a single year or a number of years — will not explain whether the existing relationship is good or bad, i.e., whether it conforms to the requirements of the economic laws of socialism and the requirements of the socialist economy at each stage of its development.

But if we bear in mind the rough nature of the calculations of the gross product of industry and agriculture, this data will help to assess not the precise relationship but its trend and development. On the other hand, this trend can be ascertained without any calculations. It is characterized by a continuous and systematic growth of the share of industry in the overall output of both branches. For instance, in the aggregate product of industry and agriculture the share of the latter has declined from 27% in 1953 to 24.3% in 1958. This stems from a higher rate of growth in industry than in agriculture and reflects the operation of the law of preferential growth of output of the means of production.

The continuous and systematic reduction in the share of agriculture in total industrial and farm output is entirely natural. It also stems from the

further extension of the social division of labor as a result of which, as Lenin pointed out, one sector of industry after another, and one branch of processing of raw materials after another, break away from agriculture and function independently.

In the years of Soviet rule new branches of industry specializing in processing agricultural raw materials have been created and developed in the country. One may cite the following branches which formerly came within the sphere of agriculture: cotton ginning, wool-washing, felt production, leather, production of fats (manufacture of glue, gelatin, bone meal, bone superphosphates, etc.), production of meat and related products, manufacture of dehydrated and pickled vegetables and fruits, production of fruit juices, syrup and extracts, manufacture of margarine, dairy products, starch and molasses, manufacture of canned goods and vitamins, etc. New branches of industry have also come into being which produce mixed feeds and corn seeds for agriculture.

Growing industrialization in the processing of farm produce was regarded by Lenin as one of the forms of agricultural development, "the form that shows most vividly the conversion of agriculture into a branch of industry..." (2) Thus we see that while the absolute volume of agricultural output is expanding, its share in the aggregate product of industry and agriculture, and therefore in the whole of the national economy, is decreasing.

Under the circumstances the decreasing share of agriculture in the combined output of industry and agriculture is in essence the reverse side of the process of the country's growing industrialization. The question is, however, to what extent is the share of agriculture decreasing over a definite period of time. This, of course, stems from the difference in the rate of growth of industry and agriculture, the higher rate of growth of the former compared to the latter. Establishment of the concrete proportions which will secure a higher rate of growth in industry than in agriculture depends

on the concrete economic and political conditions prevailing at each stage of the country's development. In planning the rate of growth in these branches of the economy; in speeding up the growth of one of them in relation to the other; in taking proper steps to help the lagging branches catch up with the others; in eliminating partial disproportions arising in certain sectors of the socialist economy and in certain links of reproduction, the Party and the government take account of all the requirements of the socialist society and the practical possibility of satisfying them to the utmost.

It will be recalled that before the war the major portion of national resources was used to achieve the principal economic task — the industrialization of the country. This was a necessary condition for the successful development of all branches of the economy. This was pointed out in the decision adopted at the Plenum of the Party Central Committee held in September 1953. Addressing the All-Union Conference of Leading Communist Work Teams and Shock Workers, Comrade N. S. Khrushchev stressed that we had been deliberately restraining the development of certain branches of light industry in order to give priority to the development of heavy industry. Now we can allocate more resources for the expansion of light industry.

Correct proportions between industry and agriculture in a certain sense means the establishment of correct proportions in the distribution of labor resources between these branches. A balanced distribution of labor resources among the different branches of the national economy is an objective necessity in all forms of society. In a letter to L. Kugelmann, Karl Marx wrote: "The necessity of distributing social labor in definite proportions cannot possibly be done away with by a particular form of social production but can only change the form in which it appears." (3)

Marx remarked that under the capitalist system the necessity of distributing labor resources in definite proportions according to branches and spheres of production functions spontaneously, only a posteriori, as an inner, blind and natural necessity. Under the socialist system on the other hand, the distribution of the labor force among branches proceeds according to plan. Marx stressed how important it is under socialism to distribute labor time according to plan in the different branches of production. (4)

A relative decline in the population employed in agriculture due to its transfer to industry and service occupations is a natural feature of the distribution of the labor force between industry and agriculture. This results from rising labor productivity and the development of productive forces. The

following figures show the changes in the number of people employed in Soviet industry and agriculture (total employment in these two branches equals 100)

	Agriculture	Industry
1928	90.9	9.1
1937	70.0	30.0
1955	58.1	41.9
1958	57.5	42.5

While in 1928 the number of people employed in agriculture was ten times the number employed in industry (including construction), in 1958 there were only 30% more people employed in agriculture than in industry. While the number of people employed in agriculture has decreased, gross agricultural output in the same period has gone up almost 80%. This process is largely explained by the advance of industry, which creates the necessary conditions for mechanizing and electrifying farm work, increasing its labor productivity and thereby releasing labor resources.

The decline in the number of people employed in agriculture is in itself a progressive development. It promotes higher productivity of social labor inasmuch as work in industry and construction is more productive. For instance, while the number of people employed in industry in 1955 accounted for 41.9% of total employment in industry and agriculture combined, the share of industry in the national income (to be exact, in the net product) in the same year amounted to 70% of the aggregate income yielded by industry and agriculture.

But all this is true only if the necessary, scientifically determined employment proportions in industry and agriculture are observed. Yet it should be pointed out that violation of the principle of material incentives may lead, and in certain cases has led, to a faulty distribution of labor resources between industry and agriculture. This was the case between 1950 and 1953. After the September 1953 Plenum of the Party Central Committee, the Party took a number of steps to raise the material incentives of collective farmers in increasing their farms' output (higher state purchase prices for farm produce, etc.), and this helped to restore a normal, balanced distribution of the labor force between industry and agriculture. Between 1953 and 1956 the number of people employed in the collective and state farms and in the MTS increased by 2 million, i.e., by 7.6%, while the gross output of collective and state farms during the same period

increased by 41%. During the period covering 1931-1958 the number of people employed in collective and state farms, in the MTS and RTS, decreased by 1%, while in agriculture as a whole production went up to 51% and labor productivity in the collective and state farms increased by 50 and 41% respectively.

When the Seven-Year Plan was launched the relationship between the growth of industry and

agriculture was greatly improved. The gap between the rates of growth of both branches narrowed, inputs of labor per unit of output in agriculture were cut, and proper conditions were created for a balanced development of industry and agriculture. An important feature of these proportions during the Seven-Year Plan period is the high rate of agricultural growth, a rate which approaches the rate of growth in industry. This can be seen from the following figures:

	Growth of Production		Average annual rate of growth of production	
	1958 in % of 1951	1965 in % of 1958	1952-1958	1958-1965
Industry	213	180	11.4	8.6
Agriculture	168	170	7.7	7.9

Under the Seven-Year Plan, the high rate of growth of agricultural production attained in the first few years, which is close to the rate of growth of industrial production, is to be maintained. Gross industrial output during this period will go up by 50% and farm output will increase by 70%. This means that the average annual rate of growth of industrial and agricultural production will be 8.6 and 7.9 respectively.

Obviously these relationships cannot be considered as constant and optimal for all future stages of communist construction. The concrete proportions of development of two subdivisions of social production — heavy and light industry, industry and agriculture — depend on concrete circumstances that cannot always be predicted and may change. At the same time there remains the unalterable necessity of giving priority to the rate of growth of production of producers' goods and of a higher rate of growth in industry than in agriculture. This will secure a continuous expansion of socialist production and a steady improvement of the living and cultural standards of the population.

The rate of growth of industrial and agricultural production provided for in the Seven-Year Plan is secured by the corresponding capital investments. Investments in industry and agriculture in the period under review will be double the amount in the preceding seven years (1952-1958). Investments in agriculture will total 500 billion rubles.

The considerable rise in farm output will fully satisfy the population's requirements for staple foods and sharply increase the resources of

agricultural raw materials for industry. As a result, the disproportions which existed in former years between the rate of growth of industry and that of agriculture will be fully eliminated by 1965, and firm foundations will be laid for a balanced expansion of the basic branches of the national economy.

But the rate of growth is not the only important factor. Proportionality in the development of the two major branches of the economy will also be greatly improved because the planned volume of industrial and agricultural output will be attained with smaller inputs of living and materialized labor, as may be seen from data on the growth of labor productivity (See table on the top of the following page).

In the period 1959 to 1965 the average annual rate of growth of labor productivity in industry will be somewhat lower than in the preceding seven-year period. It must be borne in mind that during the current seven years the working week will be substantially reduced, and this will have a considerable effect on the decrease in the rate of growth of annual output. On the other hand, hourly output will increase much more rapidly than annual output, and the rate of growth of hourly output will rise. It must be borne in mind that the "weight" of each per cent of growth of labor productivity in industry is steadily increasing. In 1952 one per cent amounted to 5.2 billion rubles, in 1959 to 10.5 billion, and in 1965 it will be worth 18.5 billion rubles (in comparable prices).

In agriculture, especially in the collective farms, the annual rate of growth of labor productivity will

	Growth of labor productivity		Average annual rate of growth of labor productivity	
	1958 in % of 1951	1965 in % of 1959	1952-1958	1959-1965
Industry	158	145-150	6.7	5.5-6.0
Agriculture:				
Collective farms	162*	200	6.3**	10.5
State farms	155*	160-165	5.6**	6.9-7.4

* 1958 in % of 1950

** Average annual rate in 1951-1958

be much higher than in preceding years; it will be higher than in industry although in the past it was much below the growth rate in industry. Marx pointed out that the less time society spends for producing wheat, livestock, etc., the more time it has for other material and spiritual production. In the period of comprehensive communist construction this point is of exceptional importance.

While higher labor productivity by 1965 will account for 75% of the increase in industrial production (in the fifth Five-Year-Plan period the figure was 68% and in 1956-1958 it was 72%), in agriculture output will go up by 70% despite a decrease of approximately 3 million farm workers. This is one of the signs of improved proportions between industry and agriculture.

The provisions made under the Seven-Year Plan for a high rate of growth of farm labor productivity, accompanied by a substantial increase in agricultural output, are based on a fuller utilization of the tremendous potentialities inherent in the socialist economy and in our industrial expansion. To achieve this a higher degree of mechanization of agricultural production will be necessary. Although agriculture is highly mechanized at present, many labor consuming processes are performed by hand, and as a result production costs in agriculture are still high. Comprehensive mechanization of all processes is the decisive factor in achieving a sharp decline in costs of production. It has been estimated that if the collective and state farms are supplied with the machines they need, labor inputs in corn production can be cut to one fifth of their present level, and in the production of sugar beet and cotton to one third of their present level. Under the Seven-Year Plan industry is scheduled to supply agriculture with vast quantities of machines, including more than one million tractors, about 400,000 grain combines, and many other machines and implements. As

a result, the power capacity available in agriculture will be doubled and consumption of electric power will increase almost fourfold. In 1960, for instance, about two thirds of the collective farms were electrified compared to only 40% in 1958.

However, it is not only the actual quantity of machinery that is of primary importance; what is just as important is that agriculture will be supplied with new types of machines which will relieve the collective farmers of difficult and relatively unproductive work. Thus, they will be in a position to increase output with much lower outlays of labor and resources. Industry is scheduled to supply the farms with a large number of more efficient and speedy tractors, self-propelled chassis with a wide range of mounted implements, etc., all of which is bound to save labor. The use of mounted ploughs, cultivators, grain and maize seed-drills will release about 200,000 farm workers annually.

Since the output of milking machines and other equipment will be considerably expanded, livestock farms will be mechanized on a much greater scale. At the present level of mechanization in this agricultural sector, the number of workers on livestock farms would have to be doubled, which would mean the transfer of an additional labor force of 5 million by 1965.

Under the Seven-Year Plan the supply of mineral fertilizers will be tripled. This is of paramount importance for achieving the principal task of field husbandry — raising the crop yields. Mixed feed production is to be increased fourfold — from 4 million tons in 1958 to 18-20 million tons. Output of seeds processed by industrial methods will be greatly expanded. Twenty-five new enterprises for gauging corn seeds will be added to the 16 that are in operation at present. The supply of the collective and state farms with gauged, high-grade corn seeds will make it possible for them to obtain much

her yields and substantially to cut down labor inputs in the production of this valuable fodder crop. The rate of agricultural growth planned for the period 1959 to 1965 is higher than in the preceding seven-year period and is closer to the rate of industrial growth.

It should be noted that a measure of the balanced development of industry and agriculture is provided to the extent to which they meet each other's requirements rather than solely by the high rates of growth of these branches.

The balanced development of agriculture is designed to fully satisfy the population's requirements for farm produce and industry's raw material needs. Between 1953 and 1959 per capita consumption went as follows: meat and fat — 27%, milk and dairy products — 40%, eggs — 44%, sugar — 37%. But this was not enough. The 21st Party Congress has set the task of achieving the world's highest living standards for Soviet working people. To realize this aim agriculture must create a real abundance of farm produce. This can be achieved only if farm production is intensified and attains a higher degree of mechanization.

As the output of agriculture expands there will be corresponding expansion in the procurement of farm produce. Under the current plan all procurements will be handled in the form of state purchases. Purchases of raw cotton, flax fiber and oilseed will increase by about 40%, purchases of sugar beet will go up by 60%, milk — 84%, livestock and poultry (live weight) — almost 100%, eggs — 120%. In 1960 purchases of meat were to go up by 14%, milk — 12%, wool — 9%, raw cotton — 3%, sugar beet — 12%.

It should be noted that the farm produce purchased by the state will cost less than in the past. The reason for this lies primarily in the fact that the state farms now have a considerably larger share

in the production and deliveries of farm products. Second, it is due to higher labor productivity and a higher degree of specialization of agricultural production by areas. This gives the state the opportunity of purchasing products where they are cheaper. For instance, since the virgin land areas have been cultivated, they have yielded 60% of the total grain purchased by the state. As a result, state purchases of grain have been discontinued in the republics of Tajikistan, Turkmenia, Georgia, Armenia, and in certain regions of the Russian Federation. Purchases of grain were also discontinued in the Baltic republics in 1958. This enabled them to concentrate on the branches of agriculture better adapted to local natural conditions.

In 1965 the cost of production of grain (in comparable prices) will be 30% lower than in 1957, that of cotton — 20%, of meat — 10%, of milk — 23%. Lower costs of production in agriculture will bring about a decline in state purchase prices and a rise in the living standards of the people.

Under the socialist system society deliberately maintains the required proportions in the process of reproduction, including the balanced development of industry and agriculture. As our vast program of national economic development is being put into effect, all the necessary conditions are being created for the harmonious development of industry and agriculture in the current seven-year period.

Footnotes

(1) V. I. Lenin, Collected Works, Vol. 3, p. 545 (Russian edition).

(2) *ibid.*, pp. 245-246.

(3) Karl Marx and Friedrich Engels, Selected Works, Vol. II, p. 442, 1955 (Russian edition).

(4) See Marx and Engels Archives, Vol. IV, p. 119.

M. KOLGANOV:

Some Questions of Narrowing the Difference Between the Two Forms of Socialist Property

Property belonging to the whole people represents the highest degree of socialization and is the chief and dominant form of property in the national economy of the USSR. It embraces all major means of production in industry, construction, transport, distribution; it applies to land, mineral resources, water and forests. In agriculture, however, collective farm-cooperative property predominates both with regard to the number of enterprises and the relative volume of output.

The relative importance of the forms of socialist property in agriculture is characterized by the following figures (as of the end of 1959): state farms

and other state establishments hold 30% of the cropland; collective farms. — 66.4%; private subsidiary husbandries of factory and office workers — 0.9%; and individual peasants — 0.01%. The proportion of output accounted for by the subsidiary husbandries of collective farmers varies with different crops. It is insignificant (about 1%) in the production of grain, industrial and fodder crops. On the other hand, these husbandries account for 31.1% of the area under vegetables and melon crops. In animal husbandry the relative shares of the different types of enterprises are shown in the following table (as of the beginning of 1960):

	State farms and other state establishments	Collective farms	Private subsidiary husbandries		
			collec- tive farmers	factory and office workers	individ- ual peasants
Cattle	16.6	42.8	23.3	10.2	0.1
Including cows	12.0	37.6	34.4	15.9	0.1
Pigs	24.0	50.1	18.8	7.1	—
Sheep	22.5	56.3	16.1	5.1	—
Goats	3.2	15.8	46.5	34.2	0.3

The subsidiary husbandries of collective farmers also account for a relatively high share of the marketable output of animal products. This is illustrated by the table shown on the top of the following page (data apply to 1958; in % of total marketable output).

Collective farm-cooperative property is not isolated from state, general public property, but is closely bound up with it. The land used by the collective farms belongs to the state. The collective farmers own not only the property of their collective

farms, but together with all citizens of the socialist state they are owners of all the material goods included in general public property.

Collective farm-cooperative property is not only intertwined with state, general public property, but is increasingly acquiring the features of the latter. Comrade N. S. Khrushchev's report to the 21st Party Congress indicates the following paths of development of collective farm-cooperative property and its merger with general public property: 1) the steady growth of the collective farms' non-distributable assets; 2) the increasing coverage by collective farm production of all branches of agriculture.

* This article is intended to pose the question.

	Meat and fat (slaughter weight)	Milk	Wool
State farms and other state establishments	26	22	28
Collective farms	47	63	62
Private subsidiary husbandries of collective farmers	23	14	10
Private subsidiary husbandries of factory and office workers	4	1	0.3

and an increase in its share relative to the output of the private subsidiary husbandries of the collective farmers; 3) a constant extension of production ties among the collective farms; and 4) a merger of collective farm means of production with state, general public, facilities, in connection with the development of electrification, mechanization and automation of agricultural production.

All these processes have been at work in our agriculture in recent years. Thus, the non-distributable assets of collective farms increased from 16.8 billion rubles to 185.7 billion rubles between 1953 and 1959, that is, by 160% (in comparable prices and after taking account of the 1958 livestock valuation). They rose markedly in 1958 with the sale of the machine and tractor-station equipment to the collective farms. In 1959 the collective farms assigned 33.3 billion rubles to the non-distributable assets compared to 16.8 billion rubles in 1957. The equipment they acquired upon the reorganization of the machine and tractor stations is worth 21.7 billion rubles at purchase prices. In addition, by July 1959, they bought new equipment from the repair and technical service stations valued at 5 billion rubles.

The relative weight of the socialized sector of collective farms in recent years has been steadily growing and that of the private subsidiary husbandries declining. The proportion of the latter's crop and has decreased from 4% in 1950 to 2.7% in 1959; in the case of cattle it has dropped from 32% at the beginning of 1951 to 23.3% at the beginning of 1960. At the same time collective farms have been enlarged and their number has thus diminished. In 1959 there were 53,400 collective farms compared to 242,500 in 1937 and 121,400 in 1950. Inter-collective-farm ties have appeared and have been considerably developed: associations for the construction of electric power plants and transmission lines from the state grid; land improvement projects and irrigation works; inter-collective-farm

building organizations; inter-collective-farm enterprises for the production of building materials and peat, for livestock fattening and artificial insemination; inter-collective-farm poultry incubation stations, repair works and motor transport depots; inter-collective-farm associations for setting up seed, fodder, food and other reserve and insurance stocks, for jointly building and using cultural and public services: schools, sanatoria, hospitals, rest homes, Young Pioneer camps, radio and telephone stations, clubs, theatres, etc.

Inter-collective-farm organizations in some cases embrace a group of collective farms and in others the collective farms of whole districts and groups of districts (such, for example, are the inter-collective-farm building organizations in the Estonian SSR). On the basis of primary inter-collective-farm organizations, regional and republic inter-collective-farm building councils have been formed (in Stavropol and Krasnodar territories, in Chernigov and Kiev regions of the Ukraine, in Moldavia, etc.). In the Ukraine, inter-collective-farm seed, fodder and food insurance stocks were set up in 1955.

There are also cases of direct merger of state and collective-farm facilities in building irrigation and land improvement projects, in planting forest shelter belts, in road construction, in peat production, etc. An important form of state assistance to collective farms, one that promotes the narrowing of the difference between and the merging of the two forms of property, is the extension of state credit to the collective farms. As a result of this, both the fixed and the working capital of the collective farms are increasingly formed with the participation of the state.

Thus, with mechanization and electrification essential changes have taken place since collectivization and are continuing to take place on the collective farms, changes which bring collective farm-cooperative property increasingly closer to state

property. Collective farm production has become more concentrated, the importance and role of the farms' collective sector and non-distributable assets have risen immeasurably; inter-collective-farm and mixed collective farm and state enterprises have sprung up. All the processes mentioned above will be intensified in agriculture and will gradually obliterate the distinction between collective farm-cooperative and general public property. Collective farm-cooperative property (and above all the non-distributable assets, its basic and most important part) is more and more taking on the character of general public property. This is also expressed in the relation of the members of a collective farm to its means of production. It is a fact, for example, that the non-distributable assets, which include not only the collective farms' means of production, but also all their commonly-owned property (buildings, structures, livestock, etc.), cannot be divided among the members or sold. If a collective farm is liquidated its non-distributable assets are transferred to another collective farm or to the state. This was a feature of the non-distributable assets even at the first stages of collectivization. As decided by the first collective farmers' congress in 1928, the non-distributable assets "remain entirely in the possession of the collective farm for the whole period of its existence. If a collective farm is liquidated, they are handed over to the common collective-farm fund administered by unions of collective farms."

(1)

Academician S. G. Strumilin had every reason to say in his dispute with A. I. Pashkov that the non-distributable assets "are not group property of the collective farms," (2) for group property in the real sense of the term presupposes the possibility of dividing the property among the members of the group. Hence, the term "group property," which has been used among us to describe collective farm property since the publication of J. V. Stalin's Economic Problems of Socialism in the USSR, is not a very suitable one. More correctly, collective farm property should be termed cooperative, collective, but not group property.

The fact, however, that the non-distributable assets cannot be divided if a collective farm is liquidated, does not at all mean that they belong to the whole people rather than to the collective farm, as Academician Strumilin holds. (3) The non-distributable assets, indeed, cannot be converted from collective, cooperative property into private property. But this was prohibited solely for the purpose of safeguarding collective farm property and not in order to restrict its existence and development. The right of a collective farm, as a collective owner, to use, possess and allocate its non-distributable assets are

not restricted in any way. Neither the state nor other collective farms may in whole or in part use or dispose of these assets. The collective farm is their sole owner.

If the non-distributable assets were really the property of the whole people, as Academician Strumilin writes, there would be no problem now raising collective farm-cooperative property to the level of general public property. It is a fact that collective farm-cooperative property is approaching the nature of general public property but is still far from identical with it.

What distinguishes collective farm property from state property at the present time? The answer, in part, may be given as follows: 1) The cooperative collective farm form of organization of labor. This presupposes membership, initiation payments, and the worker's connection with the means of production of the given farm. State socialist enterprises, as we know, practice the free recruitment of manpower through a system of hire characterized by socialist content. On the collective farms the relationship between the collective farmers and the means of production presupposes not hire, but membership in the collective. 2) The specific collective farm form of distribution of output, under which the output — partially in kind and partially in money derived from its sale — is distributed among the members of the given collective farm (after allocations to the farm's collective funds). The surplus product created by its members is the source for financing its capital investments. 3) The existence of the private subsidiary husbandries of the collective farmers.

Of course, all these specific features of the collective farm form of property cannot be abolished at once at the present time. This would cause the abandonment of the collective farm-cooperative form of production before it has exhausted all its possibilities. For it should be noted that the state farm form of organization of agricultural production is not superior to the collective farm form in every respect. For example, on the state farms there is a rather rigid administrative system of production management, as V. V. Matskevich pointed out at the December 1959 Plenary Meeting of the Party Central Committee. There is a more democratic system of management on the collective farms. Merging of the two forms of property will evidently produce a form of labor organization which will be higher than that existing either on the present-day state farms or collective farms. Experience shows that when weak collective farms are changed to the state farm system, production improves. This practice should be continued for weak collective farms. But the main line of development of the two forms

socialist enterprises in agriculture will, it seems, be their gradual evolution to a single form. This will be more like the present state farm form of agricultural enterprises, for it will be based on general public property. But it will also certainly inherit some features from the present collective farms.

In this connection it is well to examine concretely the differences between collective farm cooperative property and general public property, and the possibility of gradually eliminating these differences with the transition from socialism to communism.

The artel form of production involves a special relationship of people to the means of production peculiar to collective farm and cooperative enterprises. While a factory or office employee works on hire at a state enterprise, a collective farmer works as a member of his collective to which he has contributed a definite share and paid an entrance fee. Factory and office employees, as hired workers, can be released from their jobs under one condition or another. A collective farmer cannot be dismissed from his work because he himself is one of the owners of his collective farm; he can be expelled from the collective farm but only if he has gravely violated the farm's statutes. In short, the members of a given collective farm are the collective owners of its means of production, while the workers of state enterprises are not, for a state enterprise is general public property. In addition, a collective farmer is constantly connected only with the means of production of his collective, whereas a worker may work at any state enterprise he desires. A worker may transfer from one enterprise to another and his relationship to the publicly owned means of production does not change. For a collective farmer, on the other hand, in order to go from one collective farm to another he must resign from his membership in one collective farm and join another; he must sever relations with one collective owner and become a member of another collective owner. When a collective farmer goes to work at a state enterprise he likewise ceases to participate in collective ownership.

Hence, one of the essential differences between the collective farm and general public forms of property is the fact that the relationship between labor power and the means of production on a collective farm necessarily requires that the person concerned is a member of the given farm, while at a state enterprise he has to be hired. Therefore, membership in a collective farm is not a formality but a manifestation of a fundamental production relation stemming from the cooperative form of property, a relation which identifies its collective character as distinct

from general public property. How is this distinguishing feature of collective farm property being obliterated and how will this process continue in the future.

The chief role here, as in all other processes of socialization, is played first of all by the development of the productive forces of agriculture, by improvements in farm implements, by expansion of mechanization and electrification and, as a consequence of all this, by the growing concentration of production and enlargement of the collective farms. All this leads to the further development of the collective farm form of property and essentially alters the relation of the collective farmers to the means of production. Large, prosperous collective farms, by their organization of labor and distribution as well as by their way of life, are much closer to state, general public, enterprises, than to the old tiny collective farms. It is one thing to be a member of a collective farm consisting of 10 to 20 families (in 1934, 33.3% of the collective farms consisted of up to 30 families), and an altogether different matter to be a member of a collective farm comprising hundreds of families. The Krasnyi Oktiabr Collective Farm in Kirov Region, for example, embraces some 140 villages and settlements and has 48,000 hectares of land. In a small collective, progress of the socialized sector depends largely on the work of individual members. In large ones, social stimuli in the organization of labor come to the fore and the dependence of the collective establishments on the activity of individual members greatly diminishes. This is even more true in the establishment of inter-collective-farm electric power plants, building organizations, enterprises for processing agricultural produce, etc. Here collective farm property, without losing its collective form, expands the latter's bounds to a scale approaching that of general public property.

Nor is it just a matter of increasing the scale of socialization which takes place in enlarging collective farms and setting up inter-collective-farm enterprises and organizations. Qualitative changes take place in the very form of collective farm property, changes which bring it closer to that of general public property. With expanded socialist reproduction on the socialized sector of collective farms, the relative weight of the non-distributable assets increases. For the collective farmer this gradually erases the difference between his farm's collective property and the public property of the whole people. Education also plays a tremendous part in the development of the collective farm-cooperative form of property. The first collective farmers worked with their pooled implements and livestock, and to a certain extent looked upon their

pooled property as their former personal property. It is altogether different with the present generation of collective farmers who work in their collective establishment using machines, implements, live-stock, and all kinds of facilities acquired by the labor of the whole body of the farm's membership. The share which every member brought with him on joining has become insignificant. The proportion of the pooled facilities and entrance payments was relatively small even before the war: at the end of 1937, all entrance payments comprised 18.9% of the total non-distributable assets. In the RSFSR, for example, in 1937 the members' initial contributions constituted 12.2% of the collective farms' fixed assets (1,389 million rubles out of a total of 11,342 million rubles). In 1958 the proportion of these initial contributions for the USSR as a whole dropped to 1.6% (2.6 billion rubles out of a total of 160.9 billion rubles), and for the RSFSR, 1,054 million out of 81,612 million rubles. The collective farms' assets consisting of their members' initial shares are becoming smaller every year.

At the present time the collective farmers are themselves amending the statutes of their farms so as to completely abolish the initial shares and entrance payments, justifying this by the fact that when a collective farmer goes to work at an industrial enterprise he uses public means of production without paying any entrance fees. Hence, a collective farm's socialized means of production should likewise, without any entrance payments, be placed at the disposal of a new member who replaces one that has left the farm. The fact is that all the productive and non-productive assets of the collective farms are now non-distributable. This makes it meaningless to divide collective farm assets into those consisting of the members' initial shares and the non-distributable assets. What is of primary importance is to divide the collective farm assets into fixed and circulating assets, as practiced by state enterprises, especially since collective farms are beginning to apply cost accounting and commodity-money relations. With the abolition of the initial-share assets, collective farm membership will become a formality and will ultimately be completely discarded. People will then be able to change from one collective farm to another and from a collective farm to a state enterprise just as freely as they do from one state enterprise to another, that is, without restrictions as to membership or initiation payments. This, however, will also call for changes in the form of distribution of the collective farms' output.

Relations of distribution are an inherent feature of every specific form of property. If the collective farm form of labor organization expresses the relations of people with respect to the means of

production, the collective farm form of distribution expresses the relations of people with respect to their output.

It is now generally recognized that payment in kind to the collective farmers for their work is not the highest form, but on the contrary, the lower and most primitive form of labor remuneration compared with payment in money. Progress here should proceed through supplanting the payment in kind form of distribution by the money form which should be further improved. Accordingly, the collective farms are increasingly practicing money payment to their members for their work. Between 1954 and 1958 the proportion of the collective farmers' money incomes increased from 47 to 58.7%, while their receipts in kind dropped from 53 to 42.4%. The collective farms are gradually shifting to guaranteed money payments to their members. As of May 1, 1959, about 4,000 collective farms had already shifted to this form of remuneration. Establishment of guaranteed money payments provides the conditions for changing to wage payments. This transition in the future development of the collective farms involves a number of other important measures.

First and foremost it presupposes a change in the methods of reckoning the work performed by collective farmers. Their work should be reckoned not in workday units, but in working days and hours. And just as workers in industry, collective farmers should be paid per month or for any other specific period if they work on a time basis, or for the work performed if they are on piece rates.

The change to guaranteed payments presupposes a level of collective farm development which will permit them to pay wages high enough to preclude an outflow of labor power to industry. A collective farmer's daily wage should not differ substantially from that of a state farm worker. Today, however, it is much lower on many collective farms. But there are also collective farms whose members earn more than industrial workers. This, as Comrade N. S. Khrushchev stressed at the December 1959 Plenum of the Party Central Committee, is just. Workers and peasants are marching together to communism. "And what does it mean to march together to communism? It means to work together to create public wealth and to receive a payment for labor which would not be considered unfair either by the workers or by the collective farmers." Collective farms whose incomes are high should increase their allocations to their non-distributable and other commonly owned assets. In changing to guaranteed money payments, collective farms should set up consumption stocks out of their produce ample enough to provide their members with agricultural

products at state prices. Drawing together the forms of payment on collective farms and wages as the sole form of distribution, will put on the order of the day the question of adjusting, for example, the pension provisions for collective farmers. Therefore, the further development of collective farm production, with the resultant growth of the non-distributable assets and the expansion of inter-collective-farm ties, is an important means for eliminating the difference between the two forms of socialist property. The growth of collective farm production, which is required for the change from the present form of distribution of the collective farms' output to wages, will dispense with the need for subsidiary husbandries. Indeed, if the collective farmers can pay with their wages all the agricultural products they need from their collective at state prices, they will have no need for their subsidiary husbandries. A high level of mechanization and, hence, a high productivity of labor in the collective establishment will make it not worthwhile to bother with subsidiary husbandries which are mainly worked by hand labor. When the relation between public and private property within the collective farms will become like that prevailing in the state socialist economy.

In some branches of agriculture, sheep and cattle raising, for example, private subsidiary husbandries will play an important part, for on a number of farms the members' receipts from the collective sector are still rather small. In such cases the collective farmers get a substantial part of the produce they need for consumption (vegetables, milk, meat) from their private subsidiary husbandries. This creates a sort of vicious circle which has been noted in our press time and again: the collective farmers work badly in the collective sector because they are not paid well enough here, and the collective farms cannot pay them much because they work badly. A way out of this situation can be found by organizing collective farm production in such a manner that it will bring the collective farmers' earnings up to the level reached by state farm workers. For a number of economically weak collective farms this will apparently mean changing over to the state farm system of production. This change by no means implies that the cooperative form of production cannot ensure the advancement of the economically weak collective farms to the level of the leading ones, that the cooperative form has outlived itself in this respect. The shift of a collective farm to the state farm system first of all requires substantial aid from the state. With this aid the collective farm quickly reorganizes its production in conformity with modern requirements. As a result, payment for work increases, labor productivity rises, incentives and labor discipline improve.

Thus, the conversion of collective farms into state farms, involving as it does a form of state assistance to collective farms, on the one hand involves heavy outlays and on the other ensures a saving of time in the task of advancing agriculture and raising the material level of collective farmers. This is of particular importance in suburban areas where there is a shortage of labor because of its flow to industry and where a rapid rise in labor productivity and marketable output is required to increase the supply of vegetables, potatoes and animal products for the cities.

In the future, with the extension of electrification, mechanization and automation, mixed enterprises in which state and collective farm facilities are pooled will spring up increasingly. This may already be observed today. For example, many collective farms now receive electric power from the state grid. Electric power stations built with collective farm funds are linked in one grid with small state electric power plants or are assigned for operation to state rural electrification agencies (Sel'elektro). Such pooling of state and collective farm facilities should be extended in the future by setting up various industrial enterprises for the processing of agricultural products on the collective farms. This will be profitable both to the state and to the collective farms. It has already become clear that without setting up industrial enterprises in the countryside it is impossible to fully utilize the manpower resources of the collective farms because of the seasonal nature of agricultural production. Without this it is also impossible to eliminate the difference between the material living standards of the working people of town and country and, consequently, the essential distinctions between urban and rural life. This, however, does not at all imply the advisability of merging agricultural and industrial production within the framework of the collective farms. The processing of certain kinds of agricultural raw materials — industrial crops particularly — which is now concentrated at large, high-capacity enterprises requiring big capital investments, cannot be organized on collective farms. As American practice shows, the separation of some production functions from agriculture, such as the processing of thrashed grain at elevators, substantially raises the productivity of social labor. Hence, a dual process will apparently develop in the future; the merger of some types of industrial output with agriculture (canning establishments, dairy plants, etc.), and the separation of some functions now performed on the farms into independent industrial establishments.

The development of collective farm property toward a merger with general public property already

poses a number of organizational questions relating to economic management.

Some economists propose that a Kolkhozsoiuz, similar to Centrosoiuz, should be organized to amalgamate all the collective farms in the Soviet Union. This organization, they suggest, should administer all the non-distributable assets of the collective farms, the inter-collective-farm enterprises, and the crop-failure insurance stocks; it should redistribute the differential land rent and on this basis should level out the payment for the labor of collective farmers; it should conduct land improvement, irrigation and other activities designed to increase soil fertility. As we see it, amalgamation of the collective farms on such a scale is hardly advisable. Some comrades feel that it is enough to set up an all-Union collective farm agency in charge of collective farms' funds in order for collective farm property to immediately be raised to the level of general public property. In this connection it should be recalled that a similar agency existed during the first stage of comprehensive collectivization (in the shape of Kolkhoztsetr). In our view this is rather a past stage of the collective farm movement rather than future one. Establishment of such an all-Union collective farm organization would not accelerate the transformation of collective farm property into general public property. But the maintenance of such an organization would involve a high overhead cost for the collective farms. On the other hand, our collective farms are hardly prepared now for a central body to administer, let us say, their non-distributable assets, insurance stocks, incomes derived from raising the fertility of the soil and from measures taken to increase crop yields. Therefore, in our view such a measure will only hamper the healthy competition between collective farms, lower their material incentives to increase yields and raise labor productivity, that is, it will lead to equalization of the collective farms in a way that will impede their progress to communism.

The two forms of socialist property cannot be merged without setting up a single form of administration. However, the establishment of an autonomous all-Union centralized organization of collective farms, far from facilitating the merger of the two forms of socialist property would, on the contrary, hamper it. Experience shows that to direct the activities of inter-collective-farm enterprises — which are growing rapidly — it is quite enough to organize the collective farms within the bounds of districts, that is, to set up district collective farm unions. Inter-collective-farm ties, as practice indicates, are developing first of all on the basis of the industrial and building operations of the collective farms, as well as in certain lines of

agricultural production where concentration is economically advantageous (for example in seed production, livestock fattening, etc.).

A rather urgent problem in the development of agriculture even at the present time is that of assisting lagging collective farms, helping them reach the level of the medium and best collective farms. Changing collective farms into state farms is not the only way to solve this problem. The state also provides the collective farms with assistance along other lines: it finances capital construction in agriculture, grants credit, etc. A highly important method of solving this problem is to merge weak collective farms with advanced ones. Some leading farm establishments, such as the Krasnyi Oktabr Collective Farm in Kirov Region, have already taken this course. The chairman of this collective farm, Hero of Socialist Labor P. A. Prozorov, says: "We have joined together with lagging collective farms in order to step up their production. And we believe that this is the proper way to proceed. Indeed, this course is followed by the advanced farms although it means a temporary decline in their operating indices and even in their standard of living. It should be noted, however, that collective farms cannot go on expanding without limit. Modern production facilities determine the optimum boundaries for enlarging an agricultural establishment. Going beyond these boundaries may lead not to a growth but on the contrary, to a decline in labor productivity. The general advance to communism requires that we decide the question of assistance to lagging collective farms on a national scale.

The merger of the two forms of socialist property, state and collective farm-cooperative property, will constitute a great step forward in building communism. However, it does not yet presuppose a transition to the communist principle of distribution according to needs. The state, general public, form of property in the cities at the socialist stage presupposes distribution according to work. Collective farm-cooperative property may grow into general public property while maintaining the principle of distribution according to work, for this form of property in itself does not imply distribution according to needs. The prerequisite for applying the principle of distribution according to needs is not the general public form of property which exists under socialism, but a definite level of labor productivity and the character of work.

While the state exists, general public property the sole form of property will be state socialist property. At the same time the personal property of citizens will also exist. Although the principle of distribution according to work and commodity relations is preserved, the latter will cease to be a

work between the two forms of socialist enterprises — state and cooperative — but will apparently remain for a long time their importance as instruments for reckoning social labor and distributing the social product. At the present time there are no signs of any need to curtail and abolish commodity and money circulation. As we continue to advance, the role of trade and money — far from diminishing — will increase. Therefore, money and trade will be used for a long time as instruments for building the communist society.

Narrowing the difference between the two forms of socialist property, along with other measures to

further develop agriculture and raise cultural and material standards in the countryside, will eliminate existing distinctions between town and country, and solve the historic task of removing the last remnants of class differences in society, the differences between workers and peasants.

Footnotes

- (1) Kolkhozy, First All-Union Congress of Collective Farms, Knigosoizuz, 1929, p. 399.
- (2) Voprosy Ekonomiki, 1960, No. 7, p. 92.
- (3) *ibid.*

Voprosy Ekonomiki, No. 8, 1960

ZAL'TSMAN

On the Introduction of Scientifically-Based Systems of Agriculture

The December Plenum of the Party Central Committee held in 1959 pointed out that in working out measures for each collective farm, state farm and district, the main task is to reveal and mobilize their reserves for increasing agricultural output. Relying on the experience of leading farms, innovators in production, and the achievements of science we must provide for better utilization of machinery, introduce progressive methods in crop production and animal husbandry and, thereby, secure a steady growth in labor productivity, a reduction of expenditures of funds and labor per unit of production and, on that basis, fulfill the Seven-Year Plan ahead of schedule on all farms.

The all-Union conference of farm specialists held in June 1960 unanimously arrived at the conclusion that there is no more urgent task at present than the rapid introduction of scientifically-based systems of agriculture in all collective and state farms throughout the country. The introduction of such systems will provide for a further considerable increase in the output of all branches of agriculture, in increased production per unit of land, and also in higher labor productivity and reduced costs of farm products.

It should be noted that questions dealing with rational systems of conducting agricultural activity have attracted and continue to attract the attention of scholars in capitalist countries. Suffice it to recall

Thunen, Thaer, Ludogovsky, Skvortsov, Ermolov and Warren, who devoted their works to these questions in the 19th and at the beginning of the 20th centuries. Now, too, these questions are being given a great deal of attention in the USA, England, France and other countries. Scientists abroad describe ways and methods of farm management in leading farms, systematize and classify agricultural enterprises into production types, and mark out zones of agricultural specialization in individual countries. These problems are dealt with, for instance, in the works of L. Heisted and J. Faith on farm regions in the USA, the studies of J. D. Black and others on organization of typical agricultural enterprises in the USA, etc.

However, the above-mentioned works are essentially limited to presenting and describing already established agricultural specialization, production types and systems of conducting farm operations in various branches. Only in individual instances are attempts made to forecast future developments and changes in the agricultural output of different zones. But nowhere in capitalist countries is science set the task of working out and introducing scientifically-based systems of agriculture into practice, systems that would correspond to the interests of both the national economy as a whole, and the given individual agricultural enterprise.

In this article we present some ideas on ways and

means of elaborating measures in each collective farm, state farm and district that would, on the one hand, take into consideration the general interests of the state and, on the other, the economy and conditions of production of each concrete agricultural enterprise, and thus ensure the rational development of farm output.

The process of consolidating collective farms, begun in 1950-1951, has not yet been fully completed. Large new specialized state farms will continue to be organized in the next few years in the eastern and southern parts of the country, as well as in suburban and other areas; a number of old state farms are being consolidated by expanding their arable land area, by cultivating new land and also by attaching additional land obtained from neighboring collective farms with their consent.

As a result of the consolidation of collective farms between 1953 and 1958, the average arable land area per collective farm expanded by 24%, the head of cattle increased by about 1.5 times, non-distributable assets rose by 3.2 times, and money incomes by 3.6 times. As for state farms, their number increased during this period by 25%, sown area per state farm increased from 3,090 to 8,740 hectares, that is, by nearly 3 times, and the head of cattle grew by approximately 2.5 times.

Thus, output in many state and collective farms increased sharply in recent years. At the same time, where further consolidation of collective farms is inadvisable, they are joining forces to build power stations, roads, boarding schools, repair shops, fattening points, hothouses, etc. The creation and development of these enterprises is heightening the role of the inter-collective-farm organizations which have arisen and increased in importance in recent years.

As a rule, the process of consolidating agricultural enterprises is accompanied by heightened specialization of farms in the districts and zones and by a growth of intensive agriculture, for the increased scale of farm output promotes these characteristics. It is also clear that the bigger the farm, the more precise must its specialization be determined, inasmuch as economically it has a stronger reaction on the conformity of specialization to the farm's inner possibilities. That is why now, with consolidation taking place in collective and state farms, we cannot confine ourselves to distinguishing cotton, potato and vegetable, livestock, grain and other specialized zones within the country, or flax and dairy, grain and cattle, and suburban zones and districts within regions and territories, without a precise specialization of each individual agricultural enterprise. Nevertheless, many consolidated collective farms still lack a clear-cut specialized economy;

production specialization is usually determined clearly only in state farms.

Proper specialization of each agricultural enterprise is the first of the basic elements of a rational system of conducting agricultural operations.

Consolidation of state farms and collective farms is usually accompanied by the intensification of production. Intensification is the main line along which the further development of our agriculture must proceed. But this does not mean that the intensive level in different zones of the country and in different enterprises should be equalized. We know that the level of intensity depends on existing economic, technical, cultural and other conditions. It thus follows that a rational and realistic level of intensive agricultural output for a planned period should be determined in each district and farm with due consideration given to all prevailing conditions. Without this it is impossible to properly establish specialization and the structure of the entire agricultural output, as well as the system of conducting agricultural operations in individual branches.

Moreover, one of the chief criteria of a rational intensive level and a rational specialization of a given farm is the maximum possible output produced per hectare under given conditions, with the highest labor productivity and costs of production not exceeding the costs of the same products in other farms of the given zone (and in some cases of other zones).

The second element is the intensive level of an agricultural enterprise. It is determined, on the one hand, by the production structure of the enterprise, that is, the combination of branches and crops and, on the other, by a rational system of organizing each of the separate branches of farming on the basis of corresponding technological maps.

The third element of a rational system of conducting agricultural operations is the determination of the economic effectiveness of planned specialization, the branch structure of farm production, and the systems of directing branches of crop production and animal husbandry.

Elaboration of the above-mentioned elements of rational systems of conducting agricultural operations and practical measures to accelerate their realization should be carried out in each state farm, collective farm and district, with due attention given to the national economic tasks of developing agriculture and to local natural and economic conditions. This is called for by the December 1959 Plenum of the Party Central Committee.

At the basis of the activities of each state and collective farm should be a proper system of conducting agricultural operations and this system should become the pivot for both the long-term and current plans of each farm. But it would be wrong to leave

these matters to themselves, without giving the necessary help to the farms.

Annual and long-term plans of state and collective farms should be based on scientifically substantiated recommendations and norms (for specialization of farms and combination of branches, systems of conducting branches of crop production, animal husbandry and others), worked out by scientific institutions jointly with planning organizations, and applicable to a given natural and economic zone, region, and production type of farm. These recommendations should be viewed as approximate standards which can be used and concretized by each farm (often with the aid of local experimental and base stations) on the spot, with due regard for its individual peculiarities. The practical importance of such scientific recommendations and norms lies in their standardized nature, that is, in the fact that they are attached to definite production types of state and collective farms. Only because of this can they be successfully utilized by farms of each production type.

It is well known that extensive use is made of standard decisions and standard projects in industry, in the organization of many industrial enterprises, especially small and medium-sized ones. In a number of branches, such as flour milling, butter production, beet-sugar refining, flax manufacturing, tanning and others, the majority of factories are built on the basis of standard projects and use standard technological schedules in the process of production. Standard decisions and projects are also employed in agriculture. At the same time, with the victory of the collective-farm system and, especially, with the consolidation of collective and state farms, definite production types of agricultural enterprises have evolved in different zones of the country. However, up to now their number and the nature of their geographical distribution have not been revealed and they have not been systematized according to their most characteristic features. This reflects the lag of science behind practice.

The term "production type" of industrial or agricultural enterprise should convey the idea of a group of enterprises similar in the following ways: 1) production goals and functions, 2) nature of the final products and 3) nature of the production process (same initial raw material, equipment, technological process, organization of labor, etc.). At the same time, we can speak of a production type of enterprise, both in industry as in agriculture, only within the limits of a definite social form of economy. In our opinion, not only should production types of capitalist and socialist agricultural enterprises be distinguished, but also production types of collective farms and state farms at the present stage. In turn, production groups of enterprises can also be

distinguished in state and collective farms, groups which are similar in their production tasks and functions, in the nature of their final products, and in the nature of their production process.

Because of zonal and other peculiarities of agricultural production, in standardizing enterprises we must use a more detailed breakdown of indicators than in industry. This requires distinguishing a relatively larger number of production types of enterprises in state and collective farm production and the establishment of more detailed indices, specifying each type separately. Thus in a single production type of socialist agricultural enterprise are included farms which are not only identical in social type and form of property, in production tasks and functions, but also similar in planned specialization, intensive level of output, and the system of conducting agricultural operations.

Proceeding from these indicators, it seems to us that one cannot attach both collective farms and state farms to one and the same production type of agricultural enterprise and, within the bounds of state farm — a state farm that is used for experimental or educational purposes and one that is used for purely productive purposes. Cotton growing and flax-dairy collective farms cannot be included in one and the same production type because of their different planned specialization. Nor can this be done within the bounds of the same planned specialization of farm units. For instance, grain-and-cattle raising collective farms in the Kuban and the North Caucasus cannot be put in the same production type because of their different systems of crop production and animal husbandry, and the different intensive levels of important branches and farm units as a whole.

Many production types of collective and state farms, geographically distributed in different natural-economic zones of the country, have evolved in our socialist agriculture. Agricultural zoning, carried out in a number of republics and regions, has shown that not only within the limits of the republics, but also in each of the territories and regions there are collective farms of several production types. Thus, in Krasnodar Territory there are about 10 of them, in Moscow Region — from 6 to 8, and in Riazan Region — from 5 to 7. Moreover, different types of collective farms are often distributed in compact groups in corresponding districts of a region.

According to data which the American economist F. F. Elliott worked out on the basis of the 1930 census, there are about 600 production types of agricultural enterprises in the USA. Considering the narrower specialization of farms in the USA as compared with the USSR and the sharper differences

in natural-economic conditions in the USSR as well as the experience in agricultural zoning in a number of republics and regions, it may be assumed that we have no less than 300 to 400 production types of state and collective farms. With 61,100 collective and state farms in the USSR at present (excluding auxiliary farms), there are, consequently, an average of 150 to 200 farms (with their further division into sub-types) to each production type of agricultural enterprise.

Scientific recommendations and norms for rational specialization and combination of branches, for systems of conducting operations in important branches of crop production and animal husbandry, and for the economy as a whole, are of great practical importance only when they are worked out in conformity with concrete production types of agricultural enterprises. It is precisely in such cases that recommendations can be viewed as standards and farms included in a given production type can make best use of them and concretize them to suit their individual conditions. This is confirmed by the work of special zonal commissions for elaborating systems of conducting agricultural operations organized by the USSR Ministry of Agriculture and the Lenin All-Union Academy of Agricultural Sciences. Considerable work has been carried out and many valuable scientific general conclusions and recommendations have been offered by commissions in recent years for various zones of the country. Although a detailed elaboration of systems of agricultural operations is far from completed, the necessity for carrying out this work in conformity with production types of farms in each republic and territory has already become evident. The most valuable recommendations have been made by zonal commissions which, after having investigated 1 or 2 territories and regions (or republics without regional divisions), have identified — within each region — the main zones of agricultural specialization and the production types of farms in each zone and, accordingly, worked out the most concrete, scientifically-based recommendations and norms. When zonal commissions investigated from 5 to 10 and more regions, and were unable to thoroughly analyze and distinguish zones of agricultural specialization and production types of collective and state farms in each region, the scientific recommendations of the commissions failed to achieve their purpose. They could not be utilized properly by the collective and state farms. Consequently, to attain the necessary practical results zonal commissions must organize their work separately for each region.

Let us examine some methodological questions connected with the establishment of production types

of agricultural enterprises in a given republic, territory and region. At the base of prevailing production types of state and collective farms there are, as a rule, objective differences in natural and economic conditions of production. The importance of analyzing these conditions in each territory and region in the process of agricultural zoning is therefore understandable.

In studying the natural conditions of farm production within a region, territory or republic, attempts are usually made to reveal the nature of the soil and climatic conditions (rainfall, duration of vegetation period, temperature, etc.), the water supply relief (terrain, size of separate tracts of land and their suitability for mechanization, etc.), the available sources of cheap power, building materials, local fertilizers, etc.

In analyzing the economic conditions of farm production, an investigation is usually made of differences in location of individual farms or districts relative to marketing points or the location of processing operations, transport junctions and highways (taking road conditions and other transport facilities into consideration), the nature and extent of land utilization (the share of arable land in total acreage, the extent to which land has been plowed, etc.), the extent to which farms are supplied with means of production (availability of power equipment, value of fixed capital per hectare and per worker, density of head of cattle, etc.), and labor resources (number of workers per 100 hectares of land and their skills).

However, in agricultural zoning and in establishing production types of agricultural enterprises we attach importance only to the most essential and stable differences in natural and economic conditions, those which have the greatest influence in the planned period on specialization, the intensive level and the resulting indices of agricultural output. These conditions vary in different districts. Thus the distance from Moscow and the transport conditions of individual groups of collective farms and districts of Moscow Region exercise a great influence on their specialization and intensive level. Differences in soil conditions, strongly influencing the nature of agricultural production in Riazan and Tula regions, as well as in districts of Moscow Region located farther from Moscow, have comparatively little effect on the specialization and intensity of agriculture in those districts which are nearest to Moscow.

As an illustration, here are some of the basic indices used in zoning agriculture in Moscow and Riazan regions and in Krasnodar Territory. These indices show the differences prevailing in a number of natural and economic conditions of

agricultural production, differences both between these regions and between separate

administrative districts within each region.

	Moscow Region	Riazan Region	Krasnodar Territory
Annual rainfall (in millimeters)	500-650	450-650	340-1,400
Share of agricultural land in total land area (in %)	44-94	65-95	26-91
Share of arable land in total area of agricultural land (in %)	34-88	24-92	24-95
Value of fixed capital per hectare of agricultural land (in rubles)	181-4,772	290-930	500-2,200
Density of head of cattle (per 100 hectares of agricultural land)	5.3-27.3	8.9-22.2	18-25
Agricultural land per able-bodied farmer (in hectares)	1.6-15.0	4.0-19.0	4.4-11.2
including arable land	1.0-13.0	1.6-12.6	3.0-11.0

In establishing the most important differences in natural and economic conditions within a region, we must determine what influence the given differences have on the structure of agricultural output (specialization), on the intensity of agriculture (expenditure of funds and labor per hectare of land), and on the resulting indices (output per 100 hectares of farm land, production costs, profitability, labor productivity) in different groups of districts or collective farms of the region, and to establish if this difference will also be maintained later, during the entire planned period. If it will not, the analysis of this difference becomes meaningless.

It follows, therefore, that determining the indices of natural and economic conditions for the classification and singling out of agricultural zones in each region is an important condition for properly working out questions involving the location, specialization and systems of agricultural operations. However, some economists approach this question in an incorrect and oversimplified manner. For example, they propose to take the index of the value of gross output per 100 hectares of agricultural land as a basis for classification, regardless of the peculiarities of any given region. Application of this result-ant index as a basis for classification may, however, lead to a situation in which farms with different types of specialization, different production structures, and even with different intensive levels in the same branches, would be included in the same group. This was confirmed by experience in agricultural zoning in a number of regions. In addition, such classification does not help to reveal the

natural connections between the conditions and the results of agricultural production.

Usually the process of distinguishing agricultural zones within a region begins with zoning according to natural conditions. Thus, five zones have been distinguished in Krasnodar Territory differing primarily in relief and rainfall (the North-Eastern steppe zone with 350 to 500 millimeters of rainfall a year, the Central steppe zone with 540 to 650 millimeters of rainfall, the Azov lowland, and zones in the foothills and along the Black Sea with 800 to 1,400 millimeters of rainfall a year). Three principal natural zones have been distinguished in Riazan Region, differing mainly in type of soil, degree of afforestation, and share of arable and bottom lands.

The natural zones established in this manner usually differ in the nature of agricultural output, specialization and intensive level. However, the transition from natural to agricultural zones demands a deeper analysis and additional classification. For instance, within the limits of a natural zone there are often groups of districts or farms with differing amounts of labor available, located at various distances from cities, industrial centers, factories for processing agricultural raw materials, transport junctions and highways. There are also groups of districts and farms within a single natural zone with differing patterns of agricultural land, with greater or lesser amounts of arable land, etc. All these economic conditions must be taken into consideration in distinguishing agricultural zones. That is why these zones are, as a rule, smaller in

the size of their acreage, while their number in a territory or region is usually greater than that of natural zones. For instance, the 5 natural zones in Krasnodar Territory constitute 6 agricultural zones with 4 subzones, while the 3 natural zones in Riazan Region make up 4 agricultural zones with several subzones. In distinguishing separate subzones within an agricultural zone, consideration is given to more detailed natural or economic differences not considered in the process of determining agricultural zones.

The suitability of the specialization which has evolved in the agricultural zones, and the intensive level of individual branches and crops in these zones, must be subjected to economic analysis. The following comparative indices are usually employed as economic criteria in individual agricultural zones and subzones: a) labor inputs per hectare and per centner of output of the principal branches and crops; b) the capital expenditures per 100 hectares (or per 100 head of cattle) in the given branch; c) output of products per 100 hectares, per 100 head of cattle in the given branch, and per 100 rubles of fixed capital in the farm as a whole; d) production cost of a unit of output in leading branches; e) net income from the principal types of agricultural output.

In the process of long-term planning of agricultural output, we should not confine ourselves, however, to determining the prevailing agricultural zones in the region (territory) and analyzing the reasons for their origin. Proceeding from the new tasks facing agriculture in the region, and also considering future possible changes in natural and economic conditions, we should introduce the necessary changes in the nature of specialization of separate zones, increasing the share of certain farm crops, intensifying particular branches or substituting others in their place.

All of this introduces essential changes in the prevailing agricultural zones and, to some extent, in the production types of farms of a territory or region. Thus, the prevailing agricultural zones and production types of farms are replaced by long-term agricultural zones and types of farms linked with the planned tasks of agricultural production.

We shall now examine another important question: to what extent do the agricultural zones which have been distinguished reflect the specific features of individual production types of agricultural enterprises. On the one hand, an agricultural zone or subzone generally includes units which are similar in production type. However, inasmuch as an agricultural zone consists of an extensive land area it can also include certain farms of other production types. In some cases there may be many farms involving two or more production types in a single

zone. Thus, in many districts of the second zone in Riazan Region there are collective farms of two production types: bottom-land used for dairying and vegetable growing, and non-bottom land used for potato and grain growing, and also swine breeding. At the same time, farms of the second production type are also more widespread in the third agricultural zone of Riazan Region. From the above it is clear that when entire districts are used as the basis of grouping and determining agricultural zones (for example, in many regions with a large number of districts and collective farms), the concepts of "territorial agricultural zone" and "production type of farm unit" should not be confused.

In our opinion, in setting up agricultural zones a region or territory it is advisable, wherever possible, to do the analysis and grouping in accordance with separate agricultural enterprises rather than districts. This would make it possible to distinguish not only the prevailing production types of collective and state farms, but also to determine the number and location of farms of each production type within the region. Such grouping is most precise and makes it possible to map out measures for each production type of farm unit. It was successfully carried out in the Transcarpathian regions of the Ukraine, where there are about 250 collective farms.

Determining the agricultural zones in a republic, territory or region, and ascertaining the predominant production types of husbandries in each zone is a preparatory stage to the further elaboration by scientific institutions and planning organizations of recommendations and norms on questions dealing with developing systems of conducting farm operations and preparing measures applicable to each production type. These recommendations should deal with questions such as the specialization of farms, a rational system of operations in each of the major branches in a farm of a given production type (technique and organization of branches, their technology, mechanization and system of machinery, capital investments, level of expenditure of labor and funds, output per 100 hectares of arable land, etc.).

A production type of an agricultural enterprise presumes not only a definite type of specialization but also a rational coordination of the separate branches within a farm unit. Such coordination is not achieved mechanically; it depends on the economic and technical peculiarities of each of the branches and crops. It is hardly advisable, for instance, to combine the growing of vegetables and sheep raising on a small suburban farm, or engage in poultry raising on a collective farm which lacks

conditions for producing cheap grain. Not long ago attempts were made to introduce the production of marketable grain in areas of the Georgian Republic engaged in horticulture and viticulture, and cotton growing in collective farms of the Northern Caucasus. To this day many farms use from 80 to 90% of their entire arable land for one crop, thereby violating the basic principles of proper land utilization. As a result of unjustified combinations of branches and crops, production types of agricultural enterprises cannot be rational. A production type is an economically and technically based combination tested in practice — of branches and crops in a finite group of farms. That is why each region and district must have not unrelated branches and crops, but complexes of branches and crops combined in production types of agricultural enterprises.

It should be noted that a scientific elaboration of systems of machines for agricultural production can likewise be realized only in conformity with one or another production type of agricultural enterprise. Any attempt to work out a system of machines in conformity with uncoordinated farm crops and branches, taken separately, will not achieve its aim and will lead either to a surplus of machinery and implements and their irrational utilization, or to an underestimation of the need for machines in secondary branches of farming.

In this question we must also mention the question of so-called land cadastre. It cannot be assumed that an economic appraisal of the quality of different soils can be conducted only on the basis of soil maps, amount of humus, moisture, etc. In making an economic appraisal of land in a country as large as the USSR, we must consider the location of the agricultural plot, transport conditions, access to cheap power, availability of labor and fixed capital. The economic appraisal of a land plot is essentially determined by the production type of agricultural enterprise suitable for this plot in the given concrete conditions.

What, then, should serve as a guide in working out scientific recommendations and norms on the question of combining branches in accord with different production types of farms? First of all, to study the technical side of this question we must utilize the material of local scientific institutions and the experience of leading workers on matters of agrotechnics, methods of maintaining livestock, systems of machinery, etc. As for the economic side of combining branches, particular importance is attached to a comparison — within each production type — of the indices of the best and worst enterprises, advanced and lagging enterprises, and also a comparison of the indices of leading farms with average indices for all farms of the given production type.

It is natural that, given equal objective conditions, the output of advanced farms of each production type can serve as an example for the other farms of the same type. But this is not in question here. The important thing is that the advanced farms, as a rule, should realize more fully the potentialities of a rational combination of the branches of their production type. This is precisely why a study of the experience of leading farms and the preparation of long-range plans for their further development are of great value in working out recommendations and norms on questions of specialization and combination of branches for all enterprises of a given production type. Such comparative analysis also helps to disclose the reasons why some farms, operating under the same natural-economic conditions, lag behind others, and also to substantiate the best ways and means of conducting separate agricultural branches and farms as a whole. Therefore one cannot agree with those economists who suggest that we restrict ourselves to a study of "average" farms in each zone as most "typical."

Scientific recommendations on questions of specialization and combination of branches of each production type should be guided not only by the general tasks of agricultural development facing a given region or territory, but also by the tasks of distributing each branch and crop in those agricultural zones and production types of farms where the highest output can be obtained with the least expenditures.

In the process of such intra-regional and intra-district planning, the volume of output and yield of farm and animal products per 100 hectares of land cannot be set at identical levels for individual districts or collective farms. The task of further specialization and concentration of agricultural production in collective farms and districts is assuming increasing importance. To solve it properly in the process of working out a system of conducting agricultural operations, we must make a comparative analysis of the level of crop yields, productivity of livestock and production costs of major agricultural crops and animal products in the different agricultural zones of a region and production types of farms. We must also make a comparative analysis of production costs of the same products in different sized farms of the given branch within farms of a given type.

On this basis, and with due consideration given to indices of advanced and lagging farms of each production type, long-term standard norms of output can be scientifically established in different branches per 100 hectares of arable land in different production types of farms in a given region.

After working out such recommendations on

questions of specialization and the structure of output for each production type of farm, recommendations and norms should also be offered on the system of conducting operations in major branches of crop production (field husbandry, horticulture, vegetable growing, fodder production and others) and animal husbandry (cattle raising, swine breeding, poultry raising, etc.).

For field husbandry, vegetable growing and horticulture there should be recommendations on the most suitable — from an agrotechnical and economic standpoint — interrelations and proportions of the major farm crops. Of equal importance are recommendations on the most rational geographic distribution of crops on different types of soil and in relation to different preceding crops, on the best grades of crops, agronomic measures and mechanization in their cultivation, with indication of norms of expenditure of labor, traction, seeds, fertilizers and system of agricultural machinery (technological maps on the main crops). Finally, the recommendations should also include a scientifically-based plan of crop rotation (field, vegetable, fodder and others) applicable to the conditions of a given production type of farm unit.

It is advisable to work out standard norms for each branch of animal husbandry on the structure of the stock, type and norms of feeding, livestock productivity, recommendations on the system of cattle maintenance in winter and summer, equipment of buildings and mechanization of production processes, approximate norms of expenditure of labor and funds per head of stock, and also substantiate the acreage required for fodder (natural and sown) and its structure, estimated per head of the given stock, as well as the type of green forage conveyer.

Practice has shown that with the great variety of natural and economic conditions of agricultural production in our country, the rational combination of measures necessary for developing individual branches of production and crops, such as wheat, milk, cotton and pork in various zones of the USSR will differ substantially. But from this one should not infer that our country has as many rational systems of conducting operations in individual agricultural branches (for instance, cattle breeding or vegetable growing), as it has production types of agricultural

enterprises. There are not very many rational zonal systems of conducting operations in one or another branch. They usually comprise 10 to 15 standard complexes — assuming, of course, that small details, often differing even in two neighboring collective farms, are not considered. At the same time, the same standard system of conducting operations in one or another branch (for instance, vegetable growing or swine breeding) is often quite suitable and may be successfully applied in different production types of farms of a given zone, and even in different zones of the USSR.

In addition to standard recommendations for individual branches, we must work out long-term plans for individual typical farms in which all the recommendations and indices of individual branches of agriculture in a given production type are coordinated.

The main difficulty in skilfully working out a system of directing the operations of an individual collective or state farm at present consists primarily in the lack of adequate scientific foundation and criteria for the agronomic and economic appraisal of projected combinations of branches, crop rotation systems, agrotechnical and zootechnical methods, systems of feeding and fodder production levels of expenditure, etc. It is precisely in such matters that state and collective farms need the qualified and concrete help of scientific institutions, planning and agricultural organizations.

Distinguishing production types of agricultural enterprises in each region and working out rational systems of conducting agricultural operations applicable to each production type, are not only of practical importance locally, but also of great scientific value. Effective generalization of this material and its economic analysis will make it possible to draw up a map showing the geographic distribution of different production types of agricultural enterprises in the USSR, current and long-range maps of the distribution of branches and crops according to types of farm units. This will make possible a thorough analysis of the intensive level of agriculture in different zones of the country, and the solution of such important problems as the economic appraisal of land, differential rent, zonal prices of farm products, tax rates for different types of agricultural enterprises, and so on.

M. SYROEZHIN:

The Index Method of Linear Programming and Some Problems

Organizing Farm Production

The sweeping tasks of communist construction in the USSR have made exceptionally great demands of those organizing production not only on a nationwide scale but also at each individual enterprise. The fullest and most efficient use of all its means of production and labor power and attaining maximum output with minimum outlays must become the rule in running every establishment. To achieve this goal, calculation practices in economic planning must be radically improved. This can be done by introducing calculation methods that would take strict account of objective data, the demands made of production, and would permit us to find the exact and best (optimum) solution of the economic problem which is being posed. It is quite evident that such methods can be based only on the application of flexible mathematical tools.

Such tools have been provided by mathematics, and now it is a matter of their extensive application in economic practice. Linear programming is such a tool.

Linear programming is a method of solving problems that permits us, under the given conditions and among the host of possible answers, to find the one answer to the posed problem which would best meet the demands made of it.

In this connection it is of interest to examine some problems in organizing farm production which can be solved by the index method of linear programming and assess the economic results of the solution. We may point out immediately, however, that the index method gives only an approximate optimum solution, though one that is quite sufficient for the practical purposes of the farm.

Here we will examine in detail the solution to one problem, pointing out for the rest only the singularities involved in posing them and the main complicating conditions.

The initial data for calculation and comparison are taken from material on the Kikerino State farm in Volosovskii District, Leningrad Region. To make our exposition of the solution easy to grasp and the presentation complete, the data are rounded off and supplemented in some cases with hypothetical

figures, which, however, can be derived as actual data in an actual problem at every enterprise.

The problem of the pattern of sown areas is one of the fundamental problems in planning and organizing farm production, for upon its solution depends the effective use of land, the basic and most important means of production. The problem may be formulated very simply: how to lay out the crops in such a way as to derive the largest possible output on a given land area, or, how to derive a given amount of products on the smallest possible area and use the rest of the land area to exceed the production program. Here again it is a question of maximum output, but in a form that is more convenient for calculations using the index method. At the same time we ignore for the time being the condition of conservation and increase of soil fertility, so as to examine it as one of the complicating conditions after outlining the problem, although the presentation of the problem — even in outline form — is not as simple as the formulation of its purpose. The solution of the problem as we have posed it is reduced to finding the best crop lay-out which meets our requirements.

Let us consider a certain actual distribution of crops among plots of land of different quality (see Table shown on the top of the following page), denoted by Roman numerals I to VI. The crops have been given the letters A to G (only these letters will be used in the intermediate tables of the calculation). The crops and plots (fields) have been grouped together, which does not affect the essence of the calculations but makes it easier to understand them. In concrete problems, however, the crops and plots must be considered in detailed groups.

Let us suppose that the over-all gross output of agricultural crops (in Table 1) does not represent actual production figures but the required planned targets for various products. This will permit us to obtain comparable calculated data.

Such targets are easily calculated as the sum of marketable output plus reproduction of seed and forage stocks. Under such an assumption the data in Table 1 represent a plan for meeting these

Table 1
Initial Crop Distribution

Plots		I	II	III	IV	V	VI	Total
Crops								
A Grain crops	V	11.0	10.0	7.0	9.0	—	—	8.4
	S	140.0	40.0	300.0	20.0	—	—	500.0
	W	1,540.0	400.0	2,100.0	180.0	—	—	4,220.0
B Potatoes	V	75.0	—	—	60.0	—	130.0	92
	S	40.0	—	—	50.0	—	60.0	150
	W	3,000.0	—	—	3,000.0	—	7,800.0	13,800
C Vegetables	V	—	140.0	—	110.0	—	160.0	154.0
	S	—	10.0	—	4.0	—	50.0	64.0
	W	—	1,400.0	—	440.0	—	8,000.0	9,840
D Root crops	V	—	—	—	—	200.0	—	200.0
	S	—	—	—	—	50.0	—	50.0
	W	—	—	—	—	10,000.0	—	10,000.0
E Hay from annual grasses	V	—	—	—	10.0	—	—	10.0
	S	—	—	—	80.0	—	—	80.0
	W	—	—	—	800.0	—	—	800.0
F Hay from perennial grasses	V	17.0	24.0	18.0	14.0	21.0	25.0	18.0
	S	30.0	70.0	100.0	200.0	70.0	30.0	500.0
	W	510.0	1,680.0	1,800.0	2,800.0	1,470.0	750.0	9,010.0
G Silage crops	V	140.0	—	—	120.0	—	—	122.0
	S	10.0	—	—	90.0	—	—	100.0
	W	1,400.0	—	—	10,800.0	—	—	12,200
Total land area (in hec- tares)		220	120	400	444	120	140	1424

Symbols: V — yield, in centners per hectare;
S — sown area, in hectares;
W — gross output, in centners.

requirements. At first glance, one can hardly notice any great deficiencies and untapped reserves in this plan. Yet it can be considerably improved by the index method of linear programming.

First of all we must establish what information is needed for this calculation.

1. Production assignments: these are contained in Table 1.

2. Plots of land with different quality of soils (soil differences): these are also contained in Table 1.

3. The yield of each crop for each of the soil

differences: this information is not fully available in Table 1. It may be supplemented in two ways: first, if a field book is kept on the farm, it is not difficult to obtain an estimate of the possible yield from the data in this book with an allowance for crop improvement measures; second, if the field book is in a neglected state and there is no one on the farm who can give a qualified agronomical appraisal of the land, the yield table may be filled in through calculations. To do this, it should be assumed that the average yield ratios among the crops are the same, and then a provisional recalculation

ould be made in terms of fodder units. To illustrate the point, we will calculate the yield (estimated) of grain crops for soil difference VI. Three crops were cultivated on this land (see Table 1): potatoes, vegetables, and hay from perennial grasses.

	I	II	III	IV	VI
A	11.0	10.0	7.0	9.0	?
B	25.0	—	—	20.0	43.0
C	—	21.0	—	16.5	24.0
F	8.5	12.0	9.0	7.0	12.5

the yield of A_{VI} , i.e., the yield of grain crops on soil VI, is calculated as follows:

Ratios with respect to potatoes

$$\begin{aligned} A_I : B_I &= 11.0 : 25.0 = 0.440, \\ A_{IV} : B_{IV} &= 9.0 : 20.0 = 0.450, \\ A_{VI} : B_{VI} &= \frac{0.44 + 0.45}{2} = 0.445, \\ A_{VI} B_{VI} \times 0.445 &= 43.0 \times 0.445 = 19.0, \end{aligned}$$

e., the yield of grain crops with respect to potatoes on the basis of the two ratios is approximately 19.0 centners per hectare.

Ratios with respect to vegetables

$$\begin{aligned} A_{II} : C_{II} &= 10.0 : 21.0 = 0.477, \\ A_{IV} : C_{IV} &= 9.0 : 16.5 = 0.543, \\ A_{VI} : C_{IV} &= \frac{0.477 + 0.543}{2} = \frac{1.02}{2} = 0.51, \\ A_{VI} = C_{VI} \times 0.51 &= 24.0 \times 0.51 = 12.24 \\ &\text{centners per hectare on the basis of} \\ &\text{the two ratios.} \end{aligned}$$

Ratios with respect to perennial grasses

$$\begin{aligned} A_I : F_I &= 11.0 : 8.5 = 1.30, \\ A_{II} : F_{II} &= 10.0 : 12.0 = 0.843, \\ A_{III} : F_{III} &= 7.0 : 9.0 = 0.777, \\ A_{IV} : F_{IV} &= 9.0 : 7.0 = 1.284, \\ A_{VI} : F_{VI} &= \frac{1.300 + 0.843 + 0.777 + 1.284}{4} = 1.051, \\ A_{VI} = F_{VI} \times 1.051 &= 12.5 \times 1.051 = 13.1 \text{ centners} \\ &\text{per hectare on the basis of the four ratios.} \end{aligned}$$

Now we can estimate the yield of A_{VI} with a degree of accuracy which is quite satisfactory for calculation. This estimate must be the weighed mean value obtained from the total number of ratios, i.e.,

Hence the yield of grains on soil VI should be calculated from the relationship between grains and these three crops on the other soils. First we convert the yield into fodder units (in centners of fodder units per hectare).

$$\begin{aligned} A_{VI} \text{ (based on estimates)} &= \\ \frac{19.0 \times 2 + 12.24 \times 2 + 13.1 \times 4}{2 + 2 + 4} &= 13.11 \text{ centners per} \\ &\text{hectare} \end{aligned}$$

Making the calculations for the other blank squares in the table in the same way and rounding the results to whole numbers, we derive data on the yield of all crops for all soil differences in centners per hectare (see Table 2 shown on the top of the following page).

This is the basic table of data for solving the problem by the index method. Naturally, the second way of calculating (estimating) the yield for all the plots is more approximate. However, if there is not great soil differentiation within the confines of a single enterprise, such an estimate may be sufficiently accurate. Besides, it may be further corrected on the basis of additional agro-biological analysis by farm specialists. We must only stress that the more exact and substantiated these data are, the more realistic the solution of the problem will be.

And so, the yield is the third group of data.

4. Finally, data in value terms are needed: planned maximum production costs and income or profit per centner of crop output, depending upon how the problem has been posed. We will examine the problem with data on profits per centner of product. Here too there are certain peculiarities: it is easy to calculate the profit on marketable output for which the sales price has been fixed, such as, for instance, potatoes and vegetables, whereas for fodders special calculations must be made to derive the profit per centner.

Profitability of fodders should be calculated on the basis of the principal livestock product on the farm. In our case it is milk. Suppose we derive, for example, the profit on one centner of hay obtained from perennial grasses. Let us assume that the limit of expenditure on this type of product has been fixed at 18 rubles per centner. If we assume

Table 2

Initial Data on Yield
(in centners per hectare)

Crop \ Plot						
	I	II	III	IV	V	VI
A	11.0	10.0	7.0	9.0	11.0	13.0
B	75.0	94.0	68.0	60.0	97.0	130.0
C	131.0	140.0	124.3	110.0	154.7	160.0
D	160.0	230.0	170.0	130.0	200.0	235.0
E	12.0	14.2	10.3	10.0	15.0	18.0
F	17.0	24.0	18.0	14.0	21.0	25.0
G	140.0	163.0	132.0	120.0	176.0	219.0

that each centner of hay contains 0.5 centners of fodder units, the cost of one centner of fodder units in terms of hay from perennial grasses is 36 rubles.

The principal livestock product on the farm is milk, and the average expenditure of fodder per centner of milk is one centner of fodder units. Then we can assume that one centner of hay fed to cows in their rations will provide the farm with 0.5 centners of milk or an income of 65 rubles at an average sales price of 130 rubles per centner. To derive this income the farm spends 18 rubles on hay and 25 rubles on converting the hay into milk (25 rubles is half the cost of one centner of milk, excluding outlays for fodder, i.e., half the outlays in animal husbandry to obtain one centner of milk from any type of fodder). Consequently, total expenditures for producing the hay and converting it into milk amount to 18 rubles + 25 rubles = 43 rubles, and the income obtained on these expenditures is 65 rubles. Hence the profit on one centner of hay from perennial grasses amounts to 65 rubles - 43 rubles = 12 rubles.

Our calculation is, of course, hypothetical, but only as regards the data used, and not the realistic nature of the method and the reliability of the results. Necessary and interesting data on the effectiveness of the various fodders used in the different branches of animal husbandry may be obtained by this method on any farm. We point out in passing that now, as a rule, analysis of the effectiveness of fodders does not go beyond a comparison of the cost of one fodder unit, whereas one and the same fodder yields a diverse economic effect in different branches of animal husbandry. The method of calculation presented above makes it possible to determine this effect exactly.

The data on the profitability of the fodders may be

taken into account in solving our problem only with respect to the leading product of animal husbandry (as was done in the above example). It is also possible to determine the average weighted value of profit (or loss) per centner of each type of fodder. Either the share of the different livestock products in output or the amount of each given fodder consumed in the production of the different livestock products may serve as the weights. The determination of the average weighted value of the profit is more accurate but also more cumbersome as far as the calculations go.

Let us assume that the necessary calculations have been made and the data on the profitability of marketable and non-marketable agricultural products — given the maximum outlays for their production — have been obtained. Then the profit expressed in rubles per centner of the various crops is as follows:

Grain crops	- 5
Potatoes	+10
Vegetables	+50
Root crops	- 3
Hay from annual grasses	+ 5
Hay from perennial grasses	+12
Silage crops	+ 2

Note: Minus stands for losses in the production of this crop on the given farm.

All the data needed for the calculations have been collected and we can now set about solving the problem, which can be presented in the form of a not very complicated table (see Table 3 shown on the following page).

Table 3

A Calculation of Rational Crop Pattern

No. of row	Profitability of crops (P1) in rubles per centner	Crops (i)	Plots of land of different quality (j); their area and distribution with respect to crops							Production program and its distribution (in centners)	
			I		II	III		IV	V		VI
			220,0	38,0	120	40,0 368,0 274,5 182,0 124,0	444,0	120,0	140,0 78,5		
1	2	3	4	5	6	7	8	9	10		
1	-5	A	11,0 —	10,0	7,0 124,0	9,0 375,0	11,0 —	13,0 —	4220 3352 0		
2	-10	B	75,0 182,0	94,0	68,0 —	60,0 —	97,0 —	130,0 —	13800 0		
3	+50	B	131,0	140,0 —	124,0 —	110,0 —	155,0 —	160,0 61,5	9840 0		
4	-3	Г	160,0 —	230,0 —	170,0 58,0	130,0 —	200,0 —	235,0 —	10000 0		
5	+5	Д	12,0 38,0	14,2 —	10,3 33,5	10,0 —	15,0 —	18,0 —	800 344 0		
6	+12	E	17,0 —	24,0 120,0	18,0 92,0	14,0 —	21,0 120,0	25,0 78,5	9010 7050 4170 1650 0		
7	+2	Ж	140,0 —	163,0 —	132,0 92,5	120,0 —	176,0 —	219,0 —	12200 0		
8	—	—	0	0	0	69,0	0	0	—		

The principal part of the table is made of the data on distribution of plots under various crops (the data in the squares at the intersections of rows A to G and columns I to VI). To the left of these squares are the data on the profitability of one centner of each type of product (column 2); and to the right of them, the data on the production program for each type of product i ($i = A, B, \dots, G$). Above the program distribution squares there are the data on the areas of different plots, and under these squares, those on the remaining land of type j ($j = I, II, III, \dots, VI$) after the final distribution of land under the various crops (row 8). The table is filled in and the calculations are carried out in the following order: in the upper left hand corners of the corresponding squares in the table, there are entered the initial data on yield, plot areas, production program and crop profitability.

First the production program of the most profitable product — vegetables (C) — is distributed. To fully meet the demand for this product, 61.5 hectares of land that give the highest yield of vegetables — soil VI — are needed (the yield plays the role of an index appraising the sequence of land utilization along the rows of the table — hence the name of this method). All in all we have 140 hectares of land of type VI, and therefore we write in square C_{VI} $\frac{61.5}{140}$; the remainder of the land — $\frac{78.5}{140}$ — is "kept in mind" on the top of column VI. In square F_{VI} we place a 0: the program for row C has been

entered and a dash is drawn through the rest of the squares in the row.

The second most profitable crop is F — perennial grasses for hay. The highest index is 25.0 for land VI. We have at our disposal 78.5 hectares of this land. That is enough to produce (25.0×78.5) about 1,960 centners of hay. We fully occupy the remainder of land VI and enter it — 78.5 — in square F_{VI} of the table.

We assign the program that is left $(9,010 - 1,960 = 7,050)$ to square F_{10} . Land VI has been fully taken up, so at the bottom of the column we place a 0 and put a dash through the unoccupied squares. The next highest index for crop F stands in square F_{II} . We have 120 hectares of land II. This provides for the production of $24 \times 120 = 2,880$ centners of hay. We fully occupy this land, enter the figure 120 in square F_{II} , put a dash through the rest of the squares in column II, place a 0 down below, and assign the remainder of the program $(7,050 - 2,880 = 4,170)$ to square F_{10} .

The third highest index — 21.0 — stands in square F_V . We have 120 hectares of land V. This will provide $21.0 \times 120.0 = 2,520$ centners of hay, i.e., the production program has not been fully allocated again. Hence, land V is fully occupied, the figure 120 is entered in square F_V , dashes are drawn through the rest of the squares in column V, a 0 is written below, and the following remainder of the program $(4,170 - 2,520 = 1,650)$ is assigned to square F_{10} .

The next index — 18.0 — is in square F_{III} . We have at our disposal 400 hectares of this land (III), i.e., the program is fully taken care of. Then 0 is placed in square F_{10} and the area of land needed ($1650 - 92$) is calculated. This figure is entered in ($18.0 = \frac{92}{1650}$) square F_{III} , and dashes are drawn through the rest of the squares in row F, since the program for crop F has been fully taken care of. Now the remainder of land III is calculated: $400 - 92 = 308$. And the remainder is "kept in mind" in the top row above column III.

The third most profitable crop is potatoes (B). Lands II, V and VI have been completely occupied. Among the remaining fields, land I has the highest index — 75.0. Altogether 182.0 hectares ($\frac{1800}{75.0}$) of the 220.0 hectares of this land that are available are needed for the potato crop. The figure 182.0 is entered in square E_I , 0 in the remainder of the program, and $220.0 - 182.0 = 38.0$ in the remainder of the land. Dashes are drawn through the rest of the squares along row B; the program has been allocated. Then we go on to the calculations for E and remaining crops, which are carried out in exactly the same way. Finally, we derive the plan for crop distribution presented in Table 3. The "saving" in land as compared with the original plan amounts to 69 hectares, or about 5% of the sown area. This is at the same time both a saving of resources in carrying out the production program (smaller volume of work for the given volume of output) and a basis for expanding production.

The "saving" in land in our calculations turned out to be rather modest because we determined the yield of crops on the various plots through calculations, and besides — for groups of crops. It is clear that in such a calculation one and the same soil difference will have the highest yield for all crops. In practice, however, this is by no means always the case. Hence, from the purely mathematical standpoint it is obvious that in distributing the highest index in each row among the different columns the "saving" in land will be much more considerable.

We note at the same time that, given a detailed description of all the crops and soils on a farm, the calculation of unknown yields for individual fields on the basis of the relationships of their yields in fodder units will obviously not lead to the placement of all the high indices in one column, but will reveal their actual placement. This is explained by the fact that in detailed tables the relationships of known yields will not be as proportional as in our example, where the effectiveness of this method has thus been somewhat impaired. But even with this modest effectiveness, a land reserve of 5% is ascertained, which, when applied to the sown areas of the collective and state farms in Leningrad Region, constitutes

about 20,000 hectares for the additional output of agricultural products. These reserve hectares can be derived only by the rational planning of the crop sowings.

The effectiveness of the method has been established. What, then, complicates its extensive practical application? First of all, it is hampered by the absence of accurate estimates of soil fertility and total production derived from year to year on different fields of the same enterprise. This obstacle may be removed only by the joint efforts of the personnel of all agricultural enterprises.

One should not wait, however, until such a system of estimates has been introduced; we must already begin to propagate the new method and introduce it in planning calculations in every possible way. As estimates of land fertility become more accurate, its effectiveness will increase.

The conservation and increase of soil fertility are of tremendous importance in agricultural production. To achieve this, our farms must practice crop rotation. In connection with our problem this means that the calculated optimum solution will not be employed every year but after a certain number of years. In the intervening years an "inferior" solution will be applied. In this "inferior" solution for example, in the year after the optimum solution has been employed, the index 0 will have to be put in the squares where the sowing cannot be repeated or where the sowing cannot be done because of an unfavorable predecessor. Here, of course, the land reserve revealed in the optimum plan will be curtailed or will even vanish altogether. After a certain period of time the possibility of using the optimum variant will arise again. The cycle will be exactly the same for a fixed production plan, unaltered profitability of individual crops, and a table of yield in which only the index 0 can appear in place of the yield in the optimum variant.

Under these conditions the task of agronomy is reduced to organizing farming operations in such a way as to return to the optimum crop distribution in the minimum possible time.

In practice, however, yield and profitability and the production program are all variable magnitudes. In this case there can be no cycle for which the problem could be solved once and for all. The only thing that can be done is to solve the problem of the crop pattern every year, taking into account the preceding circumstances, measures for increasing yields and changes in the production program. Changes in value categories must also be taken into account. The solution in such a continuous chain of problems will be an optimum one each time, the best under the limitations characteristic of the given year.

It must be emphasized that even in the case of crop rotations the problem of a rational crop pattern can and should be solved. In the first place, this is possible, because "not everywhere and not always is it advisable to change the crop on a given rotation field every year. It frequently happens that it is more profitable (my italics — I. S.) and more expedient to cultivate the same crop on a given field for a number of years."* Second, it is possible because, even when it is absolutely necessary to change the crops on each field every year, there still remains a certain freedom of choice in selecting the replacement either from the group of similar crops (winter crops, spring grains, sown grasses, etc.) or from crops in another group (spring crops after winter ones, etc.). Thus, in any case, a multivariant solution of the problem presents itself for the whole aggregate of sown areas. Therefore, again one must check the best of the many possible solutions. And it is precisely such a solution that is the goal of the calculations performed by the method of linear programming.

Hence, there arises the possibility of employing the index method on farms which are introducing or have already introduced crop rotations.

Furthermore, the use of the linear programming method permits us to conduct crop rotation practice itself on a well-grounded basis, making it possible to select the most economically suitable crop rotation pattern of the many variants appropriate for the given farm. True, such a problem cannot be solved on the basis of the index method. More precise and flexible methods of calculation are needed for this. However, in practice these methods also require of the person using them only a knowledge of the calculating procedure and arithmetical operations.

There is something else to notice. On farms where perennial grasses are cultivated, the planning of crop sowings must be done a year ahead of time. That means, for instance, planning the crop pattern for 1961 in the spring of 1960 so that the sowing of grasses will be carried out in 1960 on a well-grounded basis. This likewise complicates the use of the index method of linear programming. However, when enterprises can have well-substantiated data on the production program for a number of years, this complication is of a purely organizational nature.

An examination of the factors complicating the use of the linear programming method in the given problem leads us to a conclusion characteristic of concrete applications of linear programming in

general: the main difficulties in applying this method may be attributed either to insufficient information or to shortcomings in the organization of planning. The methods of solution themselves are quite comprehensive and effective: they always indicate the best solution of a planned task for the limits within which the problem has been posed and for the criteria through which an answer is being sought.

In addition to its use in planning the crop pattern, the index method of linear programming can be used to plan fodder rations for livestock and to distribute mechanized field operations among the available fleet of tractors.

The planning of fodder rations (fodder mixtures) is one of the characteristic problems of linear programming, a problem that has long been examined in literature abroad.

Under the conditions of a socialist agricultural enterprise, the purpose of posing and solving the problem lies in subordinating the narrow local interests of the enterprise to the economic interests of the country as a whole. This is reflected in the restrictions imposed in the problem — for example, restrictions on fodder purchases.

In solving this problem by the index method the table of yield for crops and plots is replaced by a table of nutritive values for types of fodder and nutrients, and the crop production program is replaced by a table of nutritive requirements of the productive head of livestock. In this connection we cannot add together, for example, the digestible protein for dairy cows and the digestible protein required for hogs.

In posing this problem the diverse qualities of land resources are replaced by diverse types of fodder resources.

The problem is to find the most economical way of using fodders to produce a specified volume of livestock products. Value criteria are given, of course, not with respect to nutrients but by branches of animal husbandry. Value criteria may be taken into account according to types of fodders, and the calculations then carried out on their basis. The important thing in posing and solving this problem is to substantiate with sufficient accuracy the nutritive requirements of the livestock, allowing for the non-linear nature of the relation between the growth in production of livestock products and the increase in fodder consumption.

Distribution of operations among tractors is a more complicated problem in view of the great importance of time-schedules in fulfilling operations, their sequence or simultaneous performance. Therefore, the index method of linear programming can be applied to the calculations for the disposition of farm machinery provided the calculation

V. V. Matskevich, Speech at All-Union Conference of Agricultural Specialists on June 14, 1960, Sel'khozgiz, June 15, 1960.

procedure set forth above is supplemented. The procedure for applying the method is as follows: first, the necessary information is collected and its part in the problem is defined. For this, one must have:

- 1) a table of production quotas for tractors and types of operations to serve as a table of indices;
- 2) the volume of work for each operation in the planned period to serve as a production program subject to fulfillment;
- 3) the reserve of operating time for each tractor in the shifts to serve as resources of different qualities available for use;
- 4) the schedules for fulfilling operations to serve as the basis for a definite order of distributing the program; distribution must begin not with the earliest dated operation but with the operation that is most important from the agro-economic standpoint. We are not going to clarify this term here but will confine ourselves to noting that on every farm the order of distribution of operations can and must be determined with proper consideration of local conditions.

The calculation itself is the usual one. But one thing should be taken into account — namely, that in view of agrotechnical conditions some of the operations must be carried out simultaneously. This may mean absolute simultaneity (with the initial and terminal dates of operations coinciding), or partial correspondence. In the process of distributing operations among the tractors, it may turn out that one of the simultaneous operations does not take up the full reserve of operating time of a certain tractor. If the time-schedule of operations is not taken into account, some free shifts may be entirely used up to carry out other simultaneous operations. However, the time-schedule of operations must be taken into account. Therefore, a dash must be drawn through the squares of the calculation table corresponding to the operations with fully coinciding time-schedules (except the squares already occupied by one of the coinciding operations). In the case of incomplete coincidence of time-schedules of operations, the unused reserve of operating time of the given tractor may be used for distribution — but only for the non-coinciding operations. This requires additional calculations aside from those for the basic table.

Solution of this problem as posed results in the minimum tractor operating time needed to carry out a given volume of work, with a strict observance of the time-schedule of operations.

Naturally, in solving the problem of distributing operations, available trailers and mounted implements must be taken into account. If it is possible to perform a given operation on the same tractor with different mounted (or trailing) implements, each

variant must have an independent column in the calculation table. It is also clear that the problem can be solved only for the available machine and tractor fleet as a whole and for the entire volume of scheduled work without dividing it up by crops. The data obtained in solving the problem are used to compile technological maps for individual crops

We have examined very briefly three of the most widespread and most important problems in planning and organizing the practical operation of our farms. Specialists and executives at all the country's collective and state farms are confronted with posing and solving these problems. What is characteristic of all of them is a multivariant solution. The goal toward which agricultural workers are always striving is the selection of the one best solution out of the many possible variants. However, more often than not this goal is not attained: one or two variants of the solution are worked out, compared, and the more effective one is accepted for implementation. As a rule, this is not the most effective of all possible variants. The methods of linear programming offer a principled way of finding this best, optimum solution for a very wide range of problems.

The concrete application of linear programming methods requires much more research by economists, mathematicians and technologists. However, the solution of problems by linear programming should now be introduced into farm practice. This will be beneficial to both farm practice and to the method itself. Farm practice will gain economically and the method will be supplemented with details that have not been fully worked out, for only the practical application of the method can be a source of its highest perfection. The preparations made for the linear programming of a problem are not only technical but also creative, research operations. This also applies fully to the questions that have been touched upon in this article.

The application of the simplest method of linear programming to the solution of three of the most important economic problems in agriculture permits us to introduce a strict system of calculation instead of the guesswork now characteristic of farm practices in many places. It promotes an improvement in the appraisal of land, fodder and machinery utilization and in the organization of planning.

As for practical results, a method of calculation with an efficiency of 5% deserves general attention; what this may mean for the collective and state farms of Leningrad Region has already been indicated. The effect may be still more applicable when the method is applied to agriculture on a nationwide scale.

Research work on the methods of linear programming and their practical introduction in our agriculture should be widely extended. Production practice as well as economic science, agronomy and mathematics are all involved here. The close collaboration

of these three sciences is guarantee of success in the great and important work of using mathematical methods in economics and in the organization of farm production.

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EREMEEV AND V. KHALTURIN:

Methodology for Determining the Economic Effectiveness of Capital Investments in Agriculture

Note by editors of *Ekonomika Sel'skogo Khoziaistva*—

During the current Seven-Year Plan capital investments in agriculture by the state and the collective farms will substantially exceed the actual investments for the period covering 1918 to 1958. This means that the assessment of the economic effectiveness of capital investments acquires special significance. This problem, however, has not yet been sufficiently worked out by economists. Economists' treatises on agriculture express very different opinions on this subject, as well as on the indices to be used in this field.

The editors request readers to express their views on the problem treated by Comrades Eremeev and Khalturin.

Capital investments in agriculture are used for expanding and improving the fixed production assets, housing development and the expansion of cultural and service facilities. The growth of capital investments and their efficient use are an essential condition for intensifying all branches of farm production for the purpose of increasing output with a minimum outlays of labor and resources. The task is to allocate investments to the branches and for those measures which, within the shortest possible time, will generate a maximum increment of output with a minimum outlays of labor and resources per unit of product. The proper allocation of capital investments can be secured only if their economic effectiveness is correctly assessed.

In determining the economic effectiveness of capital investments in agriculture the specific features of this sector must be taken into account. The

principal asset in this sector is land, which, unlike other means of production, if properly utilized becomes more fertile instead of deteriorating and therefore, can yield additional income, promote higher labor productivity and make for lower production costs. In agriculture economic processes are interwoven with natural and biological ones; the schedules of work and production do not coincide, with the result that farming is of a seasonal nature, which in turn affects the utilization of its fixed assets. For instance, certain machines are used only a few days a year while their depreciation and obsolescence operate the year round. These specific features must necessarily be borne in mind in estimating the economic effectiveness of capital investments in various branches of farm production. The influence exercised by natural factors on farming changes from one year to another; it is therefore necessary to assess and compare the effectiveness of capital investments over a number of years or for certain years with relatively similar weather conditions.

Social labor productivity is the principal criterion of economic effectiveness of investments in all sectors of the national economy, including agriculture. The whole system of indices of investment effectiveness in agriculture must rest on this criterion. The growth of labor productivity means a decreasing share of living labor and a greater share of past labor, with a reduction in the aggregate labor per unit of output. This law operates at all stages of social development.

Capital investments in agriculture modify the labor processes in such a way as to reduce the outlays

of socially necessary labor for a given output. Investments provide more implements of production for living labor and promote higher productivity. Hence, capital investments which result in the application of the most up-to-date and efficient machines, advanced methods of construction and land improvement, and increases in the fixed assets of farming enterprises, stimulate the growth of output with minimum outlays of living and past labor. Thus they promote the conditions needed for more fully satisfying the requirements of every member of socialist society.

The economic effectiveness of capital investments must be determined both for the already realized and for planned investments. In doing so we must distinguish between the over-all (national economic) and the relative economic effectiveness. The former represents the value of the increase in farm output resulting from capital investment, a concomitant of which must be lower costs per unit of output; the latter represents the difference between the economic effect of several planned variants, as well as the difference between the planned and actual capital outlays.

The indices of economic effectiveness must make it possible to compute and determine the actual effect of the planned investments on the national economy as a whole, as well as in every republic, region, district, and agricultural enterprise. For measuring the economic effectiveness of realized and planned investments in agriculture as a whole, as well as in each farm, it is recommended that the following system of indices be used: savings from lower production costs, excluding outlays due to factors other than the investment; reduction in outlays of living labor per unit of output; increment of gross output per ruble of additional capital investment; increment of gross output per ruble of fixed assets; period of recoupment of capital investment.

When the first four indicators fluctuate in different directions and thus hamper the task of determining effectiveness, the period of recoupment becomes the decisive indicator of economic effectiveness of investment.

Let us now examine the methods of determining the above-cited indices.

The cost savings realized in farm production due to capital investments are estimated by comparing the production cost per unit of output before and after the capital investment. It should be noted, however, that the total savings achieved by lower costs do not accurately reflect the effect of capital investments, for the full production costs include elements outside the sphere of investment: outlays for fertilizers, seeds, chemical weed-killers, and part of the labor remuneration. It follows that these

outlays must be excluded when comparing production costs.

Thus, the effectiveness of capital investments is only a constituent part of the over-all effectiveness to be noted in agricultural production. The cost savings per unit of farm output resulting from capital investments should be calculated according to the following formula:

$$E_3 = (S_0 - ZN_0) - (S - ZN), \quad (1)$$

where E_3 is the saving in outlays for farm production resulting from the capital investment;

S_0 is the production cost of output for the given period;

ZN_0 is the amount of outlays unrelated to capital investments for the given period;

S is the production cost of output for the planned or compared period;

ZN is the amount of outlays unrelated to capital investments for the planned or compared period.

Let us take the state farms that were operated by the former Ministry of State Farms of the Azerbaijanian Republic, and compare the effectiveness of capital investments for the periods covering 1954 to 1955 and 1956 to 1958. The cost structure of certain types of outlays per 100 rubles of gross output is shown in Table 1 (see the top of the following page).

First, we must determine which types of outlay listed in the table are related to capital investments and which ones are not. Let us begin with wages. Capital investments or the operation of fixed assets require only part of the total outlays of living labor. Such types of work as weeding, potato sorting, etc., which account for as much as 80 to 90% of the total outlays of labor have nothing to do with capital investments; the remaining 10 to 20% involve expenses stemming from capital investments.

Outlays for seeds and fertilizers are not part of the expenses of operating fixed assets and therefore do not depend on capital investments. It is different with feed. Inasmuch as the value of productive and working cattle forms part of the value of fixed assets in animal husbandry, the cost of feed should be included in the cost of operating the fixed assets.

Other expenditures, including those for fuel and lubricants, spare parts, draught animals, motor transport, power and water supply, maintenance, and the depreciation of fixed assets, are costs stemming from capital investments, i.e., they are connected with the use of fixed assets. For instance, if there were no fixed assets like farm machinery, no expenditures would be made for fuel, lubricants, spare parts, and depreciation.

Table 1

Indices	1953-1955		1956-1958	
	Components of outlays (in 000 rubles)	Components of outlays per 100 rubles of gross output	Components of outlays (in 000 rubles)	Components of outlays per 100 rubles of gross output
Wages	68,253	22.50	79,322	20.02
Seeds	13,610	4.49	14,296	3.60
Fertilizers	13,635	4.50	12,393	3.13
Fuel and Lubricants	4,683	1.54	6,407	1.62
Feed	33,198	10.94	43,002	10.85
Spare parts	1,062	0.35	1,170	0.30
Draught animals	5,178	1.71	4,938	1.25
Motor transport	4,909	1.62	6,827	1.72
Electric power and water	4,256	1.41	6,611	1.67
Maintenance	7,052	2.32	11,434	2.88
Depreciation	5,975	1.97	9,412	2.38
Total direct outlays	161,811	53.35	195,812	49.42
Overhead expenses	50,101	16.51	45,818	11.56
Grand total outlays	211,912	69.86	241,630	60.98

Overhead costs are in part attributable to capital investments and in part are unrelated to the latter. Therefore they should be distributed in proportion to the size of the respective outlays.

With due regard to the above, let us classify the constituent parts of outlays shown in Table 1 according to the following pattern (Table 2 — see the end of the following page).

Thus, in the period 1953 to 1955 out of total outlays of 69.86 rubles per 100 rubles of gross output 35.25 rubles were accounted for by overhead expenses stemming from capital investments amounted to 34.61 rubles; the corresponding figures for the period 1956 to 1958 are 60.98 and 30.49 rubles.

Using formula (1) we get the following result:

$$E_3 = (S_0 - ZN_0) - (S - ZN) = (69.86 - 35.25) - (60.98 - 30.49) = 34.61 - 30.49 = 4.12$$

This means that capital investments in state farms in the Azerbaijan SSR yielded a saving of 4.12 rubles per 100 rubles of gross output. This saving was obtained through lower outlays for wages (2.46 rubles), for feed (0.09 rubles), for spare parts (0.05 rubles), for draught animals (0.46 rubles), and for overhead expenses (2.47 rubles). These items add up to a total saving of 5.53 rubles.

At the same time other components of outlays went up. The increase was as follows (in rubles): fuel and lubricants — 0.08, motor transport — 0.10,

electric power and water — 0.26, maintenance — 0.56, depreciation — 0.41. The total increase in outlays for these items comes to 1.41 rubles; thus there is a net saving of 4.12 rubles (5.53 - 1.41).

The value of gross output for three years (1956-1958) totalled 396,262,000 rubles. This means that the total savings accruing from capital investments amounted to 16,326,000 rubles ($396,262,000 \times 4.12$).

It should be stressed that the 100% assessment of investment effectiveness on the basis of the over-all savings realized in all operations as a whole is very inaccurate. For instance, if the total saving per 100 rubles of gross output amounts to 69.86 - 60.98 = 8.88 rubles, the saving in outlays attributable to capital investments amounts to only 4.12 rubles. The balance of the saving is realized by the reduction of costs not related to investments.

Indices of savings of outlays of living labor per unit of farm output play an important part in assessing investment effectiveness. It will be recalled that a substantial share of capital investments is used to increase the power capacity supplied to living labor and to equip the farms with various types of machinery. Mechanization and automation of production in agriculture are decisive factors in labor saving and in raising labor productivity. Savings of living labor in a planned period compared to the preceding period, or the savings involved in different planned variants are determined in man-days of

Table 2

Indices	1953-1955		1956-1958	
	Components of outlays (in 000 rubles)	Components of outlays per 100 rubles of gross output	Components of outlays (in 000 rubles)	Components of outlays per 100 rubles of gross output
<u>Outlays unrelated to capital investments</u>				
Wages	54,603	18.00	71,390	17.98
Seeds	13,610	4.49	14,296	3.60
Fertilizers	13,635	4.50	12,393	3.13
Overhead expenses	25,051	8.26	22,959	5.78
Total	106,899	35.25	121,038	30.49
<u>Outlays stemming from capital investments</u>				
Wages	13,650	4.50	7,932	2.04
Feed	33,198	10.94	43,002	10.85
Fuel and lubricants	4,683	1.54	6,407	1.62
Spare parts	1,062	0.35	1,170	0.30
Draught animals	5,178	1.71	4,938	1.25
Motor transport	4,909	1.62	6,827	1.72
Electric power and water	4,256	1.41	6,611	1.67
Maintenance	7,052	2.32	11,434	2.88
Depreciation	5,975	1.97	9,412	2.38
Overhead expenses	25,050	8.25	22,859	5.78
Total	105,013	34.61	120,592	30.49
Grand total	211,912	69.86	241,630	60.98

equivalent length (or in man-hours) per unit of output, and are calculated on the basis of the following formula:

$$Z_t = \frac{Z_1 - Z_{r1}}{P_1} - \frac{Z_2 - Z_{r2}}{P_2}, \quad (2)$$

where E_t is the saving of labor in man-hours or man-hours per unit of output;

Z_1 and Z_2 are the outlays of labor in the compared periods or in different variants of capital investment;

Z_{r1} and Z_{r2} are the outlays of labor for work unrelated to capital investment;

P_1 and P_2 are the gross output in the compared periods or in the different variants of capital investment.

During the period covering 1953 to 1955 the Azerbaijanian state farms expended an annual average of 1,536,443 man-days, and in 1956 the figure

was 1,571,920 man-days, of which 1,229,155 and 1,414,728 man-days respectively were not expended for anything related to the capital investments. The average annual gross output in these periods total (in hundreds of rubles) 1,011,140 and 1,320,870 respectively. Application of formula 2 to these figures gives the following result:

$$Z_t = \frac{Z_1 - Z_{r1}}{P_1} - \frac{Z_2 - Z_{r2}}{P_2} = \frac{1,536,443 - 1,229,155}{1,011,140} - \frac{1,571,920 - 1,414,728}{1,320,870} = \frac{307,288}{1,011,140} - \frac{157,192}{1,320,870} = 0.30 - 0.12 = 0.18$$

This shows that an average of 0.18 man-days per 100 rubles of gross output were saved due to capital investments.

A comparison of the outlays of labor per unit of

put in the planned period and the preceding one, in two previous periods, reveals the savings of or stemming from additional capital investments. The over-all savings of living labor are ascertained by multiplying the saving per unit of output — derived from formula (2) — by the compared volume output. These savings in man-days or man-hours may be expressed in terms of the average annual number of workers released from some branches of agriculture and channeled to others, or the number recruited for new developing branches.

The assessment of savings of labor is extremely important for long-term and annual planning of agricultural development for the USSR as a whole as well as for each constituent republic, territory, region and district, when decisions have to be made on the further development of agriculture, the geographical distribution of new branches, and in adding national requirements to the available resources of manpower.

The savings yielded by lower production costs and the savings of living labor are directly dependent on the growth of aggregate farm output and on rates at which outlays of living and past labor are being reduced. In determining the economic effectiveness of capital investments we must ascertain the increment of gross output (in comparable prices) per ruble of additional capital investments per ruble of fixed assets. The increment of gross output is determined as the difference between outputs in the current planned period and the preceding one, or between republics, regions, districts and enterprises, or between different variants of capital investment. The magnitude of this difference, related to additional capital investments will disclose the degree of effectiveness of capital investments.

The increment of gross output per ruble of additional capital investments is ascertained by means of the following formula:

$$R = \frac{V - V_1}{K - K_1}, \quad (3)$$

which R is the increment of gross output in comparable prices per ruble of additional capital investments;

V is the gross output in the planned or compared period;

V_1 is the gross output in the preceding period;

K is the additional capital investment in the planned or compared period;

K_1 is the above for the preceding period.

Annual capital investments in the Azerbaijanian state farms in the period 1953 to 1955 averaged

26,430,000 rubles, and for the period 1956 to 1958 the figure was 28,641,000 rubles. The volume of gross output in these periods has already been shown.

Applying formula (3) to these figures we have the following result:

$$R = \frac{V}{K} - \frac{V_1}{K_1} = \frac{132,087}{28,641} - \frac{101,114}{26,430} = 4.61 - 3.82 = 0.79$$

Thus there was an increment of 0.79 rubles of gross output per ruble of additional capital investment. Inasmuch as the state farms had also achieved a saving by reducing the production cost of every unit of output, it is obvious that in the three-year period 1956 to 1958 the effectiveness of capital investments was higher than in the preceding three-year period (1953 to 1955).

The volume of gross output per ruble of additional investment in the planned period, expressed in percentage of the data for the initial period, shows the rate of growth of investment effectiveness. In determining the economic effectiveness of capital investments it is essential to ascertain the effectiveness of utilization of fixed assets, assets which will be continuously growing in volume during the period of full-scale communist construction.

The economic effectiveness of all fixed assets in agriculture is determined by the following formula:

$$E_f = \frac{V_1}{K_1} - \frac{V}{K}, \quad (4)$$

where E_f is the increment of output per ruble of fixed assets;

V and V_1 are the volumes of output in the compared periods or in the different variants of capital investment;

K and K_1 are the values of the fixed assets in the compared periods or in the different variants of capital investment.

The annual average value of fixed assets in Azerbaijanian state farms in the period 1953 to 1955 reached 154,208,000 rubles, and in 1956 to 1958 the figure was 184,213,000 rubles. The following result is obtained through formula (4):

$$E_f = \frac{V_1}{K_1} - \frac{V}{K} = \frac{132,087}{184,213} - \frac{101,114}{154,208} = 0.72 - 0.65 = 0.07 \text{ rubles.}$$

The increment of gross output in the last three years was 0.07 rubles per ruble of fixed assets in operation.

In determining and analyzing the effectiveness of investments in agriculture it is extremely important

to ascertain the influence of capital intensity on the productivity of living labor. This is achieved by comparing the rates of growth in output and capital intensity per average annual farm worker or per man-day or man-hour of farm work. If the growth of labor productivity exceeds that of fixed assets, it indicates that the effectiveness of aggregate capital investments is growing. Inasmuch as technical progress reduces the cost of producer goods and raises the efficiency of fixed assets, it results in a decline in the outlays of both living and materialized labor per unit of output. This is a factor of great importance, for as mechanization of agriculture makes further progress, productivity of social labor will rise largely as a result of lower inputs of materialized labor.

The recoupment period of capital investments is one of the basic indicators of the latter's economic effectiveness. This recoupment period can be accurately computed only if we consider the actual role of capital investments in promoting economic effectiveness, leaving aside all other factors determining the effectiveness of agricultural production as a whole. The ratio of the sum of capital investments to the annual savings of production costs achieved as a result of the investments is the criterion for determining the period of recoupment; the inverse ratio shows the coefficient of effectiveness of capital investments. Once the recoupment period and the coefficient of effectiveness are known, it is possible to select the optimum variant of capital investment in cases where the above-cited indicators of investment effectiveness are of a conflicting nature.

The recoupment period of capital investments is calculated by means of the following formula:

$$L = \frac{Kn}{Eg},$$

where L is the period of recoupment of capital investments;

Kn — the amount of capital investments;

Eg — the annual cost savings due to capital investments.

In the Azerbaijanian state farms annual capital investments in the period 1953 to 1955 averaged 26,430,000 rubles; in the period 1956 to 1958 they averaged 28,641,000 rubles; the average annual savings resulting from lower production costs attributable to the investments amounted respectively to 3,200,000 and 5,428,000 rubles. Formula (5) gives the following periods of recoupment:

$$L = \frac{26,430}{3,200} \approx 8 \text{ years} \quad L = \frac{28,641}{5,428} \approx 5 \text{ years}$$

In the planned or compared period the shortest period of recoupment, compared to the initial period, indicates the increased effectiveness of capital investments.

To reach a final conclusion on the effectiveness of capital investments in these state farms during the two three-year periods under review we may bring the calculated indices together in Table 3.

Table 3

Indices	1953-1955	1956-1958	Decrease (-) Increase (+)
Money outlays connected with capital investments, per 100 rubles of gross output (in rubles)	34.61	30.49	-4.12
Labor inputs in the operation of fixed assets, per 100 rubles of gross output (in man-days)	0.30	0.12	-0.18
Volume of gross output per ruble of additional capital investments	3.82	4.61	+0.79
Volume of gross output per ruble of fixed assets	0.65	0.72	+0.07
Period of recoupment of capital investments	8	5	-3

As we can see from the above figures, between 1953-1955 and 1956-1958 the outlays attributable to capital investments fell by 4.12 rubles per 100 rubles of output, and inputs of living labor resulting from capital investments also dropped by 0.18 man-days. On the other hand, there was an increase in gross output of 0.79 rubles per ruble of additional capital investment, and of 0.07 rubles per ruble of fixed assets. The period of recoupment declined by 1.5 years. All of this indicates that the effectiveness of capital investments in these state farms has increased.

Some economists hold that the essential purpose of capital investment is the replacement and expansion of aggregate (fixed and current) assets, and not merely the replacement and expansion of fixed assets. Their argument is that fixed assets are ineffective in the absence of current assets. Hence, the process of production is impossible without current assets. For this reason those who hold this

view think that it is necessary to determine the economic effectiveness of the aggregate of fixed and current assets. The point is, however, that if capital investment is viewed as investment in both fixed and current assets, the economic effectiveness of capital investment and that of agricultural production will coincide. This means that the advocates of this concept identify the notion of effectiveness of capital investment with the effectiveness of agricultural production, thus ruling out the methodological problem of determining the effectiveness of capital investment. In our opinion this view is at odds with the decisions of the July 1960 Plenum of the Party Central Committee, at which it was pointed out that our economists are remiss in working out a methodology for planning, in studying the problem of raising the effectiveness of capital investment, of making rational use of fixed and current assets, and other problems posed by economic practice.

Ekonomika Sel'skogo Khoziaistva, No. 11, 1960

MATTUKHA:

Studying Family Budgets of Collective Farmers

Outstanding achievements have been scored by the Soviet people in economic and cultural development in raising the welfare of the urban and rural population during the Soviet period. As a result of the great upsurge in all branches of the national economy and the rise in labor productivity, the national income — the best general index of the rising well-being of the people — is growing year by year. In 1959 it was almost 25 times the 1913 level. The national income fully belongs to the working people in the Soviet Union. The greater part of it is used to satisfy the constantly growing requirements of the people, and the remainder for the further expansion of socialist production and to meet other public needs. Consequently, the increasing national income is the basis for a steady rise in the real incomes of wage and salaried workers and collective farmers. Between 1940 and 1959 workers' real incomes doubled and collective farmers' incomes in cash and in kind more than doubled. The great upswing in Soviet agriculture, based as it is on the preferential development of heavy

industry, assures a steady improvement in the living standards of the people, standards which comprise a complex of man's material and spiritual requirements. Economic statistics has worked out a system of indices depicting the living standards of the population. These include indices of the national income, wages and salaries, collective farmers' incomes, and data on grants and bonuses paid out to the population from the state consumption funds. Also taken into account are indices of retail trade, the growing number of cultural, educational and service establishments, the scale of housing construction, the population increase, and so on.

The living standards of the Soviet people are constantly studied, using for the purpose government accounting records and regular and special sample surveys conducted by the Central Statistical Administration of the USSR Council of Ministers.

A survey is conducted of more than 51,000 family budgets of workers in industry, the building trades, the railways, and of state farm workers, engineers, technicians, office employees and collective farmers.

These surveys cover more than 27,000 families of collective farmers in 1,159 collective farms in the country's principal agricultural areas. The surveys include collective farms specializing in different branches of agriculture. Collective farms and families are picked in an objective and random manner — without distortion. It is up to the family to cooperate or not. The survey is made monthly throughout the year covering the same families. Many collective farm families are visited for several years running for the purpose of studying the nature of changes taking place in their budgets.

The statistical data are drawn up from information provided by members of the family on incomes and expenditures. The families keep a special record of incomes and expenditures, including the following items: earnings received for work done on the collective farm or in state, public or cooperative organizations; receipts in the form of pensions, stipends, and other grants and bonuses; income in kind received from the collective farm and produce from the personal subsidiary plot; money spent on food, clothing, footwear, cultural articles, household goods, payments for all kinds of services, and so on. In addition, records are kept of tax and other payments.

To compile the budget of a collective farm family the statistician visits it at least twice a month.

The extensive survey program includes many questions on the composition of the collective farm family and the employment of its members; how much they work in the common husbandry and how much in their personal subsidiary husbandries, in state, cooperative or public organizations; also questions on income in cash and in kind, its sources, on what items they spend their money and how much for each item; what they eat and what manufactured and agricultural goods they buy; what farm produce they sell, etc. In addition, every month the statistician takes detailed inventory of the turnover of agricultural produce in the collective farmer's household, the turnover in his livestock and poultry, their productivity, the amount of fodder used and other expenditures and items of income.

As the income in kind derived from the common and personal husbandries is of great importance in the collective farm household, the aggregate material values and services received by the family in the course of the year are computed at the end of the year. The aggregate income is calculated according to the model balance table which is shown in the adjoining column.

The table shows that the aggregate income of the collective farm family consists of annual earnings for work on the collective farm, in state and public establishments, offices and organizations, income

Aggregate Income (Income from the Collective Farm and Other Sources)

Crop Production: grain, potatoes, vegetables and melons, fruits and berries, etc.

Products of Animal Husbandry: meat, lard, milk, etc.

Cash and Other Receipts from the Collective Farm

Income from the Personal Husbandry (net produce)
Crop Production: grain, potatoes, vegetables and melons, fruits and berries, etc.

Products of Animal Husbandry: meat, lard, milk, eggs, wool, natural increase in farm animals and poultry.

Receipts from State and Public Organizations:
wages, pensions, grants, etc.

Products of Forestry, Hunting and Fishing

Incomes from Other Sources

Total

Distribution of Aggregate Income (Expenditures on Consumption)

Foodstuffs: grain products, potatoes, vegetables and melons, fruits, meat, milk and dairy products, fats, fish and fish products, eggs, sugar and confectionary items, etc.

Manufactured Goods: ready-to-wear clothing and linen, fabrics, footwear, furniture, household goods, cultural articles, medical goods, fuel, building materials, etc.

Expenditures on Recreation and Services: rest-home and sanatorium accommodations, cinema theatre, transportation, mail, telegraph, telephone, housing and utility services, etc.

Accumulations: increase in stock of foodstuffs and fodder, increase in the number of farm animals and poultry, new and overhauled structures, increase in savings bank deposits and cash on hand

Losses in the Household, Taxes, Duties, and Other

Expenditures.

Total

from the personal husbandry, and from some other sources. All expenditures of the family are also counted, including the annual increase in accumulations: in foodstuffs and fodder, the number of farm animals and poultry, savings bank deposits and cash on hand.

In calculating aggregate income of the collective farm family the income in kind (grain, vegetables

atoes, meat, milk and other products) derived from the common and personal husbandries are reckoned in money terms. Various prices are used to evaluate the income in kind. Products received from the collective farm and the personal husbandry, consumed by the family or stored are generally reckoned at state retail prices. That part of the produce sold at the collective farm market or to other organizations is reckoned at the selling prices. The products and manufactured goods bought by the family are reckoned at the purchase prices. Only net produce, or the difference between the gross output and the cost of production for the year (seeds, seedlings, fodder, fertilizers, implements, and transportation costs) is included in determining the income from the personal subsidiary plot.

To calculate the aggregate income of the collective farm family in full, indirect income received from state and social consumption funds is also counted. This includes free education for the members of the family at general and specialized secondary schools, at colleges and at advanced training schools and refresher courses, free medical services, maintenance of children at children's institutions below cost, accommodation at rest homes and sanatoria, state maintenance of theatres, clubs, boarding schools, and a great number of other cultural and service establishments. The aggregate income, including the share received by the collective farm family from state and social consumption funds, makes up its total income.

This complete inventory of the collective farm family's income is particularly important in comparing the material and cultural standards of the population of the USSR with those of the working people of capitalist countries, who are compelled to spend large sums of money on education, medical services and to meet other needs.

Social consumption funds are steadily increasing in the Soviet Union. More and more expenditures on cultural facilities and services are borne by the state. For instance, while in 1958 the state consumption funds amounted to 215 billion rubles, in 1965 they will increase to approximately 360 billion rubles.

The data obtained in the surveys show that the collective farm system has changed the lives of millions of peasant families beyond recognition. Illiteracy has been wiped out and a wide network of medical, cultural and educational establishments has been built up in the countryside. A new rural intelligentsia has come into being. The material requirements and cultural interests of the collective farm families have changed. Their diet has considerably improved, with consumption of livestock products, fish, vegetables and fruit increasing and that of bread and potatoes decreasing.

Before the Revolution peasants in Russia lived on the verge of starvation. A typical picture of their hard life at that time was drawn by the provincial doctor A. I. Shingarev, a liberal, who in 1901 and 1907 made a detailed survey of sanitary and economic conditions in the villages of Novo-Zhivotinnoe and Makhovatka in Voronezh Gubernia. He found extreme poverty, chronic undernourishment, unsanitary conditions and general illiteracy among the peasants. Of the 156 males between the ages of 10 and 60 living in the village of Makhovatka, only 25, or 16%, were literate or semi-literate; the 168 females between the same ages were all illiterate.

Bare walls and benches, and sacking, straw and outdoor clothes used as bedding — all this presented a typical picture of a peasant's hut, where livestock, too, was often kept in winter. Shingarev wrote that of the 161 households in Novo-Zhivotinnoe and Makhovatka villages 46 had no fresh cabbage, 77 never had sugar, 88 had no pork, 40 no mutton, 48 no beef, 78 no herring, 59 no milk, and 74 no butter. Chronic undernourishment caused epidemics and a high mortality rate, particularly among children.

Life has changed beyond recognition in these villages in the Soviet period. The Rossiia Collective Farm, uniting both villages with their 364 households, is growing stronger from year to year. The collective farm has tractors, harvester combines and other modern farm machinery, as well as 11 trucks and 2 cars. Its output of grain, sugar beet, potatoes, meat, milk and other products is steadily rising thanks to the high level of mechanization and the industrious work of its members. The farm's income is growing and the farmers' well-being is rising. Its total cash receipts in 1959 amounted to over 3.7 million rubles. As many as 150 new cottages have been built by the farmers within the past few years. The collective farm has electricity and wireless and will soon have running water. There are three schools in the two villages with some 270 children studying in them, a hospital, three clubs, a movie theatre, several stores, and three libraries with 10,000 books on their shelves. A survey of family budgets of the Voronezh Region collective farmers has shown that consumption of meat and meat products, fats, vegetables and other food products was immeasurably greater in 1959 than before the Revolution, while the consumption of bread and other grain products was much lower.

The table shown on the top of the following page shows the changes that have taken place in the average consumption of foodstuffs and manufactured goods by each member of a collective farmer's and industrial worker's family between the pre-war year 1940 and 1959 (the figures are taken from surveys made for 1959 and 1940, with 1940 = 100).

Consumption	Collective Farmer's Family	Industrial Worker's Family
Grain products (bread, flour, groats and macaroni items)	96	73
Potatoes	125	155
Vegetables and melons	119	129
Meat and lard	198	235
Fish and fish products	310	169
Milk and dairy products	164	260
Eggs	281	236
Sugar	708	217
Confectionary items	324	174

The table shows that the consumption of bread and other grain products has declined, while the consumption of highly nutritious livestock products has increased, which means a better diet, making for better physical development and improved health.

The survey indicates even more significant changes in the collective farmers' expenditures on manufactured goods, as may be seen from the following data (1940 = 100):

Purchases	Collective Farmer's Family	Industrial Worker's Family
Fabrics	205	181
of which: woollens	400	438
silks	2,231	1,915
Footwear	191	162
of which: leather footwear	228	206
<u>Money Spent on Purchases of:</u> (in comparable prices)		
Clothes	270	308
Knitted goods	382	465
Furniture and household goods	381	550
Cultural articles	1,204	1,533

The greatest rise in expenditures — a twelvefold increase — is shown for cultural items. More and more collective farmers are buying radios, TV sets, musical instruments, cameras, watches, books, motorcycles, bicycles, and other cultural items.

It should be noted that the budget survey program includes a number of indices that cannot be obtained from any other source. Of great interest, for instance, are the indices on the utilization of collective farmers' labor on the commonly-owned land, in state and cooperative organizations and in the personal subsidiary husbandries. Of no less interest are the

indices showing the turnover of livestock, their feeding and productivity, and the yield of individual crops in subsidiary husbandries.

Apart from giving a graphic picture of the well-being of certain groups of the population, these indices are most valuable for working out long-range plans for the development of the national economy for various economic calculations. They are widely used in the preparation of various balances, including balances of individual agricultural products, balance sheets of money incomes and expenditures of various population groups, and balances of labor resources.

BOLGOV:

Differential Rent Under Socialism

The question of ground rent is one of the chief problems in political economy. The experience gained in socialist construction in our country and the People's Democracies indicates that a correct settlement of the agrarian question and the realization of the alliance of the working class and the peasantry hinges on the proper solution of this problem.

Proceeding from the Marxist-Leninist theory of ground rent, our Party succeeded in solving the agrarian question and involving the peasant masses in the building of socialism by pursuing a correct policy toward the varying class groups of working peasants at all stages of the struggle for socialism. Despite the opinion of certain economists who assert that "under socialism, differential rent does not exist as an economic category," (1) this question is now becoming even more important not only in connection with providing material incentives to the peasantry, but also in connection with the further development of economic ties between the collective farms and the Soviet state, and between town and country.

The economic studies that have been published in the past few years, especially the abstracts of the discussion on ground rent under socialism held at Moscow University in the summer of 1959, show that Soviet economists have made good progress in the study of this complex problem.

However, it was pointed out during that discussion that many theoretical aspects of ground rent under socialism have not yet been fully resolved and are still controversial. The present article is an attempt to submit these debatable questions to further discussion by specialists.

Conditions and Causes of the Existence of Differential Ground Rent Under Socialism. The Basic Distinction Between Socialist and Capitalist Differential Rent

When Marx was working on the theory of ground rent he conducted statistical and other investigations

With this article, the editors of *Voprosy Ekonomiki* initiate a discussion of the problem of differential rent under socialism.

of landed property and agrarian relations in Russia, which, because of its variety of forms of land ownership and exploitation of agricultural producers, was to play the same role in the section on ground rent that England played in Volume I of *Capital* in connection with industrial wage labor. (2) Volumes XI, XII, and XIII of the Marx and Engels Archives show the great amount of work accomplished by Marx in studying agrarian relations in Russia. Death denied him the opportunity of completing these investigations. This was done by Lenin.

Upholding the Marxian theory of ground rent against revisionist trends, Lenin developed it still further, paying particular attention to the existence of two forms of monopoly in capitalist agriculture: 1) the monopoly of private ownership of land, which is not related to the capitalist form of economy and which creates absolute ground rent; 2) the capitalist form of monopoly of land as an object of economic operations, which stems from the limited supply of land and which creates differential ground rent.

Lenin pointed out that the growing part played by banks in capitalist agriculture in the epoch of imperialism leads to an intensification of capitalist centralization and concentration. This is inevitably accompanied by the ruin of masses of small independent producers — the peasants. Hence, the only way out for the peasants is to join the proletarian movement in its struggle for socialism. Thus the Marxian theory of ground rent as developed by Lenin forms part of the economic teachings of Marxism-Leninism and of its theory of the socialist revolution.

In working out the party's agrarian program on the basis of the Marxian theory of ground rent, Lenin demonstrated that while nationalization of land abolishes absolute ground rent, it does not eliminate differential rent. Here is what he wrote: "Between individual farms there are inevitable differences stemming from the varying fertility of the soil, the location of the land in relation to the market, and the productivity of additional investments of capital in the land. (3) Lenin defined these differences as differences between the best and worst tracts of land, specifying that the first two (fertility and location) form differential rent I, while the third

(productivity of additional investments of capital in the same or similar tracts of land) creates differential rent II.

Because of these differences, labor productivity on the best and worst land differs, and an additional surplus product is derived from the best land, which forms the material basis of differential rent. For this additional product to be transformed into differential rent, there must first be a monopoly of the best land tracts as objects of economic operations, failing which the surplus product cannot be appropriated by its producer; and second, it is necessary to realize this product on the market, which requires a commodity system of economy, outside of which differential rent cannot exist as a value category. It is in this sense that one must interpret Marx's proposition that "rent is the result of those social relations under which land utilization develops," and that "its origin is due to society, not to the soil." (4)

It follows therefore that Marxism-Leninism distinguishes between two sets of conditions in the formation of differential rent: 1) the conditions of production of the additional surplus product; 2) the conditions of its appropriation and realization. Under the circumstances the direct cause of the existence of differential rent as a definite historical category is the second group of conditions, i.e., the monopoly of land as an object of economic operations and the commodity form of production. (5) The common nature of these conditions indicates that differential rent is both a production and a distribution category.

The above-cited conditions of differential rent formation also remain in force under socialism, but they undergo important modifications and reflect a mode of production that is entirely different in nature.

As we know, the socialist system gives society the opportunity of greatly expanding the area of cultivated land and of increasing its fertility. However, the naturally limited supply of land and the differences in its natural fertility and in prevailing climatic conditions cannot be eliminated. This is also true of the differences in location of land tracts in relation to markets despite the great changes that are taking place as the means of transportation develops and the urban population grows. Practical experience has also shown that the tracts of land operated by our collective farms differ not only in natural fertility and location in relation to markets, but even to a greater extent in the productivity of their utilization.

In a certain sense the monopoly of land as an object of economic operations retains its importance under socialism, although the nature of this monopoly is radically changed, for the land is used not by

private individuals but by collective enterprises and it is no longer a means of exploitation of human beings. The role of this monopoly becomes even more prominent to some extent because land ceases to be a commodity and its utilization assumes a more stable character.

Some economists assert that the reason for the existence of differential rent under socialism is not the collective (cooperative) monopoly of land as an object of economic operations, but rather cooperative or collective farm ownership. This is a fallacy for the collective farms cannot have a monopoly of land as an object of economic operations unless they receive the land from the state in perpetual tenure, and unless they own the means of production necessary for cultivating the soil.

Insofar as the commodity form of production is concerned, under socialism this is also intensified for a high level of marketable surplus is a distinctive feature of the collective and state farms. Consequently, the socialist mode of production involves all the conditions needed for the existence both differential rent I and II.

It is clear, of course, that the social character of socialist differential rent differs fundamentally from its capitalist counterpart. Under capitalism differential rent is a surplus profit derived from the exploitation of farm labor; it is, as Marx puts it, a portion of the capitalized surplus labor of the peasant, over and above the labor required for his subsistence. (6) Socialist differential rent, on the other hand, represents additional net income created by the collective work of farmers who are free from any kind of exploitation.

While capitalist differential rent is connected with the existence of "a false" social value created by competition and arising "from the law of market value, to which the products of the soil are subjected" (7) socialist differential rent is in no way related to a "false" social value, for the socialist mode of production is not subject to the law of market value.

Differential rent under socialism, unlike the situation prevailing under capitalism, does not assume the form of a rental charge for land. It is appropriated not by a class of landowners, but by the collective farms and the socialist society in the person of the state. By providing certain material incentives to the collective farmers in the expansion of agricultural production, differential rent under socialism cannot be transformed into capital.

It should also be noted that under the capitalist mode of production, differential rent, as Marx remarked, operates in such a way that with a decreasing rate of productivity of capital successively invested in the same plot of land, and with a constant market price, capital investment in land

ably reaches its limit, i.e., reaches an artificial barrier. (8) Under the socialist system there are such artificial barriers to the effectiveness of successive investments of labor and capital in land. As a result, differential rent does not hinder the development of productive forces in socialist agriculture; it is, on the contrary, a contributing factor to development, for it helps to increase the material incentives of agricultural workers and to raise labor productivity.

Differential Rent I and II in the USSR. Main Trends in the Development of Differential Rent under Socialism

Although almost all Soviet economists agree that differential rent continues to exist under socialism, there is nevertheless a disagreement on the question whether both types of rent (I and II) exist, or only one of them does. Some economists hold that only differential rent I exists in the USSR, while others assert that differential rent II is the only one in operation. Some hold that it is impossible and unnecessary to distinguish between these two types of rent. This approach, in essence, leads to an underestimation of the tremendous progress made by our socialist agriculture. It will be recalled that we live under conditions in which individually owned farms predominated in agriculture, an agriculture which rested on backward and slowly developing techniques, as a result of which differential rent I was the dominant form. But the situation has changed markedly since those days. Following the Soviet Union's industrialization and the collectivization of farming, our agriculture took the path of intensified production and mechanization. Our agriculture is now conducted on a larger scale than in any other country. The outcome of this is that differential rent II is predominant.

The assertion that the division of differential rent under socialism into types I and II is purely a matter of theory, with no practical results, (9) may lead to ignoring the natural factors in agricultural production and to the denial that soil and climate maps and the economic appraisal of land are necessary. Yet without them it is impossible to properly distribute and plan agricultural production, or to adopt a sound taxation policy for collective farms. These factors play an important role in strengthening and developing the close alliance between the working class and the collective farm peasantry. It should be noted that when Marx studied the "Records of the Tax Commission" and other documents related to the agrarian question in Russia, he stressed the importance of the classification given in these materials of land plots according to fertility and

location for the proper understanding of the taxation of the peasantry and the computation of differential rent I. (10)

Some comrades hold that under socialism there is no limit to the best tracts of land and that all tracts are good because when the natural fertility of the soil is exhausted it is replaced by economic fertility. (11)

In point of fact, an increase in absolute fertility of all farm land does not eliminate inequality in fertility of different kinds of soil; it either increases it, leaves it unchanged, or merely reduces it. (12) This formulation of Marx has been confirmed in practice in our socialist agriculture. The sown area of the USSR has increased from 118.2 million hectares in 1913 to 195.6 million hectares in 1958; the average annual yield of grain crops per hectare has gone up from 6.9 centners in 1909-1913 to 9.2 centners in 1954-1958. This rise in yield indicates that the fertility of our soil has generally increased. But it is still a fact that differences in land fertility in different areas and even within a single area — differences which stem from varying soil quality and climatic conditions — remain in force. There is evidence of this from data on crop yields collected over many years in experimental stations and collective and state farms. For instance, the average annual grain yield per hectare for the period covering 1953 to 1958 was 20.2 centners in the Krasnodar Territory, 13.5 centners in the Belgorod Region, and 8.8 centners in the Altai Territory.

In the 1959-1965 program of national economic development of the USSR it is specified that the planning and actual implementation of purchases of farm produce must be closely coordinated with the proper geographical distribution of production by zones and regions; that due account must be taken of their natural and economic conditions; and that suitable measures must be adopted to promote the development of productive forces in agriculture. Hence, in studying the nature of differential rent under socialism we must consider not only differences in the economic, but also in the natural fertility of the soil, i.e., we must take account of not only differential rent II, but differential rent I as well.

In addition to differential rent I connected with fertility, under socialism there also exists differential rent I connected with the location of land tracts in relation to markets.

The emergence of the socialist mode of production has led to a great expansion of urban communities and a still greater expansion of modern means of transportation. Between 1913 and 1958 the number of cities increased from 666 to 1,679 — actually

to 4,608 if one includes workers' settlements; the length of railways has increased from 71,700 kilometers to 122,800 kilometers, and if one includes hard-surface highways and waterways the respective figures are 160,600 and 491,800 kilometers. This growth of urban centers and means of transportation has brought about important changes in the formation of differential rent I connected with location. On the one hand, it has led to a certain equalization of location characteristics (in relation to markets), for there has been a substantial expansion in the area of land which is situated not far from markets; on the other hand, it has led to a further differentiation of land tracts (in regard to location), for with increased transportation facilities and the emergence of new markets many of these tracts are now situated close to the points of sale. This is the case, for example, in Siberia, Kazakhstan, and other areas.

Thus, differential rent I connected with location has retained considerable practical significance. The investigation conducted in 1954 by the Department of Political Economy of Kharkov University in the Balashov Region showed that the collective farms situated close to their markets were able to collect differential rent I (connected with location) in amounts ranging from 7.1 to 10.6% of their total revenue because of savings on transportation. (13) On the other hand, the collective farms situated far from their markets often suffered losses, especially in cases of transporting cattle. At present the state pays the collective farms at a uniform rate for delivery of produce over distances exceeding 25 kilometers. However this does not fully eliminate the effect of differential rent I (connected with location) on the revenue of certain groups of farms.

Marx pointed out that differences in fertility and location of land tracts may operate in the same or in opposite directions. Hence, an accurate economic assessment of land, as mentioned earlier, is a necessity and it must take account of the two types of differential rent I.

Still greater theoretical and practical significance is attached to the study of differential rent II, which is connected with the intensification of economic operations — the principal way of expanding agricultural production under socialism.

Marx's great merit in formulating the theory of differential rent is that he not only freed the latter from the imaginary "law of decreasing fertility of the soil," but that he also demonstrated that the productivity of land can be increased ad infinitum through investment of capital, labor, and skill. Unlike the classical writers of bourgeois political economy (David Ricardo, in particular), who in their theories of ground rent proceeded only from

differences in natural fertility of land, Marx demonstrated that in addition to natural fertility there also exists economic fertility. (14) Economic fertility depends on the state of agricultural chemistry and mechanization and, therefore, is not uniform at different stages of development of human society. Marx defined it as "an artificial product which owes its existence to culture, to the investment of capital." (15) By the latter he meant the means of production used in agriculture. Although Marx noted that no soil yields any produce without the use of means of production, i.e., he accepted the fact that there is a certain relation between natural and economic fertility, he nevertheless always insisted on their independent significance. He demonstrated that the permanent improvements achieved in agriculture by the use of fertilizer and mechanized labor "have the same effect as natural differences in the quality of land." (16) But under a capitalist system only large enterprises can afford such improvements and this gives them additional advantages in competing with small producers. That is why under capitalism improvements in farming and the consequent economic fertility ultimately result in the ruin and elimination of peasants, for rising economic fertility brings about a fall in the prices of farm produce on the one hand and requires an increase in investment which is beyond the means of the mass of small peasant households on the other.

Intensified production under capitalism also results in the exhaustion of the soil. The reckless, wasteful exploitation of land is ended only under socialism; a rational system of farming is adopted and the rapid intensification of production proceeds without the social antagonisms inherent in capitalism.

Adoption of the socialist mode of production creates exceptionally favorable conditions for intensifying agriculture. In 40 years of Soviet rule (1918 to 1958) capital investments in agriculture (in comparable prices) have amounted to 186.7 billion rubles by the state and 210.9 billion rubles by the collective farms, making a total of 397.6 billion rubles. As a result, fixed productive assets in agriculture have increased 8.5 times between 1913 and 1958; power capacities have gone up from 23 million hp. to 138.1 million hp., including a rise in capacities of motors from 0.2 million hp. to 132.1 million hp.; electric power consumption has gone up from 35 million kwh. (1928) to 6,907 million kwh.; supply of fertilizers to agriculture (in terms of conventional units) has increased from 188,000 to 10,626,000 tons. The quality of farm labor is rising, as evidenced by the rapid rise in the number of farm specialists with a higher or

specialized secondary education (from 50,000 in 1950 to approximately 350,000 in 1958). The launching of full-scale communist construction in our country marks a new phase in the development of the collective farm system, implying further intensification of production and a steep rise in the output of all agricultural branches. The December 1959 Plenum of the Party Central Committee pointed out that for the successful fulfillment of the tasks set by the 21st Party Congress for the further development of agriculture, we must first of all ensure continuous technical progress in

mechanizing and electrifying agriculture, and on this basis achieve a more intensive production and still higher labor productivity.

We know from practical experience that the more intensively a collective farm conducts its operations, the larger is its volume of output and the higher the incomes of its members. The following table has been prepared by the Institute of Economics of the USSR Academy of Sciences in 1957 on the basis of a study of the collective farms in Belgorod Region, farms which conduct their operations with varying degrees of intensity.

	Collective farms classified according to gross output per hectare of farm land				
	I	II	III	IV	V
A. Per 100 hectares of farm land:					
Principal means of production (thousand rubles) including machines and stock	38.8	41.8	50.6	52.6	83.2
Money outlay for production (thousand rubles) including fertilizer	2.6	2.9	3.4	5.0	6.1
Gross output	7.5	8.9	11.4	15.1	15.9
Money income (thousand rubles)	0.5	0.8	1.0	1.3	1.3
Milk yield (liters)	69.3	90.3	115.8	138.5	165.2
	28.3	44.2	55.1	69.5	101.7
	8,489	10,420	13,166	15,275	20,167
B. Grain yield per hectare of arable land (centners)	11.4	13.0	14.5	14.7	18.5
C. Workday units per centner of grain	1.33	1.08	1.03	0.98	0.92

The above figures show that under socialism the work of the collective farmers is the only source of differential rent, for as Marx pointed out: "The exceptionally productive labor operates as intensified labor; it creates in equal periods of time greater values than average social labor of the same kind." (17) One of the worst shortcomings in the development of socialist agriculture at present is the existence in many regions, territories and republics of a great diversity in the efficiency of economic operations. The December 1959 Plenum of the Party Central Committee had the following to say on this subject: "At present, when an abundant output of grain produce is one of our country's pressing tasks, the work of raising the efficiency of economically

weak collective farms to the level of the leading ones assumes exceptional importance." The Plenum has mapped out a concrete program for improving the economic position of the lagging collective farms, a program which provides for a further intensification of production, a fuller and more productive utilization of their land and machinery, and the assignment to these farms of skilled managerial personnel.

By means of more intensive cultivation many leading collective farms have achieved such a high rate of stable economic fertility that the latter already appears as a form of natural fertility. The work of these collective farms indicates that when both objective and subjective factors of production are present in agriculture, under the socialist system the

latter begin to play a more and more prominent role. The mergers of collective farms that have been carried out, their specialization in a manner suitable to local natural and economic conditions, and the raising of economically weak farms to the level of the leading ones, will produce a certain equalization of incomes among collective farms while the general level of collective farm income is rising. As a result, there will be a narrower base for the formation of differential rent II in the collective farms which derive it at present. But this does not mean that in the near future differential rent will no longer act as an incentive to expanding the social economies of collective farms; it will survive for a long period of time.

Social Value of Farm Products under Socialism. Zonal Prices and Differential Rent

We noted above that the differential rent represents an additional net income created in collective farms operating on more fertile and better located land, or farms which exploit land more effectively. In quantitative terms differential rent is equal to the difference between the social and individual costs of production of farm produce, i.e., the difference between the socially necessary and individual costs of production.

This brings us to the question: how do we determine the social value of farm products under socialism? In general Soviet economists give two different answers. Some of them hold that under socialism there are not and cannot be poor tracts of land (there may only be poor farm managers). Hence, the value of farm products is determined by the cost of production on average or even on superior land tracts (superior in fertility and location). (18) Other economists, who are in the majority, assume that differences in fertility and location continue to exist under socialism and, therefore, the social value of farm products is determined by the condition of production on the worst land tracts, taking into account the average, normal production conditions in most collective farms, i.e., an average level of mechanization and utilization of labor and the means of production. (19)

Practical experience fully supports this latter viewpoint, showing that the use of the relatively poor soils is an objective necessity under socialism. The decision of the June 1958 Plenum of the Party Central Committee specifies that in determining the new procurement prices it is necessary to take account of the need to recoup the outlays of collective farms on the basis of the average zonal production conditions, growth of labor productivity, decline in production costs, and creation of the accumulations

needed for expanded socialist reproduction. Quite obviously this refers to the bulk of collective farms, not merely to the average or leading ones. This means that if the value of farm products was determined on the basis of the production conditions prevailing on average land tracts, or even on the best ones (the point raised by Professor Z. V. Atlas during the debates at Moscow University), (20) the state would have to permanently subsidize the collective farms cultivating the worst land. This is contrary to one of the basic principles of socialist economics, namely the principle of self-support, and it would hamper the efforts to raise the efficiency of the lagging collective farms.

Some people who support the first proposition on the formation of the value of farm products refer to the decision of the June 1958 Plenum of the Party Central Committee, which contains a point stating that in the near future the Soviet state will be in a position to purchase grain, meat and other produce in the areas where their production costs are lower. It is evident, however, from the content of the decision that it is not proposed in the future to stop cultivating land tracts which are inferior in fertility and location (the over-all cultivated area is being continually expanded), but to use them more rationally on the basis of specialization.

There is ample evidence of the trend of making more rational use of different kinds of soils, including those that are inferior at a given time. But even with highly developed specialization, natural zonal differences are bound to have an effect on farm labor productivity. Differences in fertility and location within each zone specializing in some particular crop will not be completely eliminated. It follows, therefore, that under socialism the social value of farm products is determined and can only be determined by their cost of production on the relatively poor land tracts, given average social conditions of production normally prevailing in other respects on most collective farms. This brings up another important point: is this social value determined by the relatively poor land on a national scale or within different economic regions and zones only? Which value should be taken as the standard in determining the prices of farm products — the national or zonal value?

In his extremely interesting article, "The Origin of Differential Rent and Its Distribution under Socialism," A. I. Pashkov rejects the view that under socialism the magnitude of value of farm products is determined not by the production conditions prevailing on the worst land tracts on a national scale but on the poorer land within the limits of each economic region. He says that if that were the

"we would inevitably break up the integrated socialist economy into many separate parts isolated from each other, each one of which would have 'best' and 'worst' tracts. It would follow that the country would not have a single 'social value' for any given kind of farm product, but as many as there are special agricultural regions. ... This interpretation fundamentally conflicts with the indisputable fact that the Soviet national economy is a single whole, not a mechanical sum of separate, completely detached and self-contained regions within which socialist economic laws operate in complete isolation from all the other regions and the national economy as a whole." (21) This concept was reiterated by Pashkov during the discussion at Moscow University. (22) Although this seems logical at first glance, we cannot fully agree with it.

First, we must point out that the integrated nature of the socialist national economy is not determined by the operation of the law of value (although this is a uniform law in all economic regions), but by the uniform socialist ownership of the means of production and the planned organization of the economy. Under communism the law of value will no longer operate, but the integrated nature of the national economy will assume even greater proportions. Hence, it is wrong to say that without a single value for one or another product on a nation-wide scale, there is no integrated socialist national economy. The deliberate use of the law of value is implemented with due regard for the concrete conditions of production — and this is particularly true of agriculture — in economic regions and zones. Even in capitalist society the uniformity of value on a nation-wide scale is very relative indeed. Marx and Engels pointed out that none of the economic laws of capitalism "have any reality except as approximations, trends, averages, not as direct realities."

This is indeed the case with the law of value, the laws of the average rate of profit and of ground rent, and of the other economic laws of capitalism. It is no accident that in the capitalist countries uniform prices do not exist for this or that product.

Marx pointed out that if the use value of a commodity depends on whether this commodity in itself satisfies some need, then the use value of the whole mass of commodities of this type depends on whether the volume of the latter corresponds to society's need for this product and, therefore, on whether the division of labor among the various branches of production is in accord with this social need. "The whole essence of bourgeois society is that it is a priori totally lacking in the conscious regulation of production," Marx remarked. (25)

One of the concrete forms of the anarchy of the capitalist economy is that the prices of farm products are determined by their market value in the form it assumes through competition. The latter, on the other hand, creates a "false" social value.

Under socialism the situation is essentially different. Marx foresaw that when society is organized as a consciously regulated association of producers, false social value will vanish because society will not obtain agricultural products from the best land tracts in exchange for a quantity of labor time far exceeding the labor time actually embodied in that product. Hence, the value of farm products under socialism must be much lower than under capitalism.

Under socialism it is possible, in principle, to determine in quantitative terms the social value of a product and the uniform planned price based on it (for agricultural produce, for instance), with a differentiation of this price according to individual economic zones and concrete production conditions. This calculation is based in the first place on the actual inputs of labor and capital and on production costs. Since under socialism any kind of labor employed in the socialist economy is direct social labor, and its quantity is socially necessary under the existing average social or normal conditions of production, in that sense the zonal value of farm products must be taken as the basis of zonal prices. Zonal value does not abolish either the uniform social value of any kind of product, nor the operation of the single law of value in all zones. On the contrary, it expresses in a concrete form the uniform social value and the effect exercised by the law of value under socialism.

To assert that the value of farm products is determined by the cost of their production on the worst land in the whole country implies either the view that in socialist agriculture — as in capitalist agriculture — a "false" social value exists, or that we must search within actual reality for a price which would provide the fullest expression of the uniform value of farm products, i.e., a price that would essentially coincide with it. Some economists hold that retail prices for foodstuffs represent this kind of uniform price. One of the speakers at the Moscow University discussion had this to say: "Introduction of retail prices into the analysis gives us an opportunity to better compute the total mass of rent created." (26)

In actual fact retail prices do not in any way express the social value of farm products. First of all, foodstuffs sold in retail shops are farm products which have already undergone additional processing to a greater or lesser extent (manufacture, transport, packing, storage, etc.). Second, we know

that retail prices are a means for redistributing the national income. To view retail prices of foodstuffs as the most suitable measure for determining the value of farm products really amounts to transferring the formation of differential rent from the sphere of production to that of distribution and consumption.

Differential Rent and Differential Income. Does Differential Rent Exist in State Farms?

Economic categories express certain definite social relations. To ascertain what aspect of socialist production relations is expressed by differential rent, we must first define the materialized form it assumes, i.e., an additional net income of the collective farm, which becomes an object of rent relations.

The textbook *Political Economy* says: "Collective farm differential rent is a net additional income in money or natural form." (27) Many economists hold that the collective farms create differential rent in the course of producing their total output, not only its marketable share. This is wrong.

Differential rent can be and is realized only in the process of sale of collective farm output. Hence, the additional net income when viewed in kind is not rent, but only the material basis of rent; or to use Marx's terminology — potential rent. Hence, differential rent is not any kind of additional or differential income of a collective farm, but only a type of income that is realized through the sale of produce to the state or to other collective farms on the collective farm market. This is why one cannot agree with those economists who hold that differential rent and differential surplus income are synonymous.

Since the collective farms realize the bulk of their marketable produce by selling it to the state, differential rent expresses first of all the relations between the given collective farm and society as a whole, between the collective farmers and the working class. These are the basic rent relations which give rise to additional or resulting rent relations connected with the division — within the collective farm — of differential rent between the accumulation and consumption funds.

If we were to identify differential rent with differential income, it would appear that, first, it is unnecessary to study differential rent separately from differential income and, second, the differential income created in state farms would be viewed as differential rent. "The state enterprises engaged in utilizing land tracts (state farms, coal pits, mines, etc.) also create an additional income connected with the fertility of the land, rich deposits of coal or other minerals, an income which is of

the nature of differential rent." (28) This view is fairly widespread among economists. Those who hold it believe that both collective and state farms are governed by the same law of value and therefore, "in the state and collective farms the mechanism of price formation and of the creation of differential ground rent is essentially the same" (29)

In reality, the commodity form of production in the absence of a monopoly of ownership of land as an object of economic operations does not result in the creation of differential ground rent. But a monopoly of this kind, in relation to one another and to society as a whole, is characteristic only of collective farms under socialism. On the other hand, the land cultivated by the state farms and the means of production they employ belong to the state. In order to prove the existence of rent in state farms, some economists assert that these farms have essentially the same land tenure system as the collective farms, by virtue of which the state farms are owners of the land. (30)

The qualifications to the effect that differential rent in state farms differs in some respects from differential rent in collective farms insofar as it is distributed differently, does not change matters. Apparently noting that distribution relations in this particular case no longer correspond to production relations, one of the participants in the Moscow University discussion stated explicitly: "The fact that the differential rent of state farms fully belongs to the state does not change anything." (31)

Some economists go even further, asserting that the distribution of differential rent in the state farms is essentially the same as in the collective farms, for part of this rent, too, is received by state farm employees. A. I. Pashkov says: "This means that rent relations also cover the relations between the state and the employees of state farms not only in the area of the production of this rent but also in its distribution." (32) In this particular case differential rent is being confused with the bonuses paid by the state to state farm employees for outstanding work.

And so we see that to identify differential rent with differential income means that we are equating production relations in collective farms with those in state farms. It is true that those who hold that differential rent exists in state farms assert that this rent, in contrast to differential rent in the collective farms, expresses a specific type of production relations; but they do not explain what the specific nature of these relations is. Hence, they are ultimately forced to declare that "there are no real rent relations here. The rent in this case is of a purely formal nature." (33)

sisting on the existence of differential rent in the farms, the adherents of this view accuse their opponents of allegedly ignoring the common element in the social nature of state and collective farms — the unity of the two forms of socialist ownership of the means of production on which they are based. However, while these economists emphasize this unity they forget at the same time those differences which make it necessary to consolidate and develop cooperative-collective farm property, to draw it closer to general public property, to transform — in the future — both state and cooperative-collective farm property into a single communal property.

Closely related to these views is the position that drawing cooperative-collective farm property closer to general public property does not change the fate of differential rent in the Soviet Union. "... Even in the exclusive existence of general public property, the relationship of the owner of land to its product (i.e., of the state to the socialist agricultural enterprise — A. B.), may survive in our country for certain historical conditions. It therefore follows that rent relations and differential rent will remain." (34) Thus, rent is made a permanent category.

But Marx pointed out that "economic categories are only abstractions of these real relations and are true only insofar as these relations exist." The transformation of cooperative-collective farm property into general public property will signify the elimination of rent relations and, therefore, of differential ground rent itself. Then collective farm income will not differ in any way from the income of the general public property farms, and, therefore, their production relations will become identical and rise to a new, higher stage, leading to communist relations.

Distribution of Differential Rent Under Socialism

Some economists hold that the outstanding problem in the theory of differential rent under socialism is the problem of distribution, for in their opinion, "it is directly linked with the essential task of supporting and strengthening the alliance between the working class and the peasantry." (36) In reality, however, the economic foundation of this alliance is, in the first place, the aid which the former, as the person of the Soviet state, has extended and is extending to the latter in the production of agricultural output. Before any income can be distributed it must be produced. For this reason the main point in the theory of ground rent under socialism is the problem of the production of differential rent, while the problem of its distribution is subordinate to the former.

It will be recalled that the Trotskyites held that differential rent is produced not in agriculture but in other branches of the national economy, and because of this they suggested that it should be fully collected from all peasant units, and that the latter should even be subjected to a supra-rent taxation. The right-wingers, on the other hand, asserted that differential rent in all peasant units, including those of kulaks, is a type of labor income. Hence, they insisted, it should be left in full to the peasants.

In the area of taxation of the peasantry the Communist Party and the Soviet Government adhered to a strict class policy: they had a different approach not only to different groups of peasants, but also to different types of differential rent, in keeping with the basic propositions of Marxist-Leninist theory.

Different conditions prevailing in the formation of differential rent I and II are bound to effect the way it is distributed in socialist society. Since the formation of differential rent I is connected either with a gift of nature or the development of the productive forces of society as a whole, under socialism differential rent I must be fully allocated to social needs.

In the "Fundamental Law on Socialization of Land" ratified by the All-Russia Central Executive Committee on January 27 (February 9), 1918, Article 17 specified that "surplus revenue stemming from natural fertility of the best land plots, as well as from their more favorable location in relation to markets, is to be allotted to social needs and turned over to the organs of Soviet power." (37) Thus, from the very outset the Soviet Government decided that differential rent I should be used for the needs of society. This principle retains its importance in present-day conditions. Not only has it lost none of its significance, but it has become even more important with the triumph of the collective farm system and its further progress and consolidation. (38)

To leave differential rent I to the collective farms located on the best land would amount to artificially introducing different economic conditions of production in the collective farm system, and would lead to an unnecessary differentiation of these farms according to the amount of their incomes. Moreover, the advantages enjoyed by the farms situated on the best land would in some cases hinder the growth of production because these farms would be receiving extra income without intensifying their economic operations.

The situation is different with respect to differential rent II which stems from the more efficient utilization of land, i.e., from more intensive farming through mechanization and application of scientific

methods and advanced experience. Some comrades (E. I. Sollertinskaia for example) assume that this "rent belongs to the people because the land belongs to the people." (39) But they forget that although land is the principal means of production in agriculture, it can be used as such only to the extent that instruments of labor and agrotechnical methods are applied.

Since the largest portion of the means of production used for cultivating the land belongs to the collective farms, collection by the state of the total of differential rent II would undermine the material incentives of the collective farms which are skillfully and persistently doing their best to cut production costs, and this would cause irreparable damage to the further progress of agriculture. On the other hand, since the state, too, is investing considerable funds in irrigation, reclamation, anti-erosion measures, rural electrification, etc., a share of differential rent II should logically be turned over to it. In our opinion, the general economic basis for determining the proportions in which differential rent II should be divided between the collective farms and the state could be (with an adjustment for the collective farm inputs of labor) the relationship between collective farm and state investments in agriculture. But there are other factors which may exercise an influence on this proportion. Therefore A. I. Pashkov is quite right in saying that "the establishment of concrete proportions in the distribution of differential rent between the state, the collective farms, and the collective farmers is a matter of economic policy which rests not only on the economic laws of socialism, but also takes into account all the concrete conditions of the country's economic life." (40) Here it should be noted that the Soviet state has never tried to collect the whole differential rent from the laboring peasantry, especially from the collective farms.

Practical experience in socialist construction has developed not only a differentiated approach to the distribution of differential rents I and II, but also different methods of collecting them for social requirements. While differential rent I is collected by the state through different zonal prices for the same agricultural product (grain, sugar beet, etc.) and by varying the sale of this product to the state according to zones, a portion of differential rent II is collected from the collective farms mainly through the income tax. This does not mean that the existing method of distributing both types of differential rent need not be improved. In particular, present-day conditions insistently pose the question of replacing taxation of the collective farms' gross income by taxation of their net income, which is a more logical policy.

As for the principle of distributing the share of differential rent II left to the collective farms for their accumulation and consumption funds, it is in the main defined by the decision adopted at the December 1959 Plenum of the Party Central Committee, which specified that the remuneration of the collective farmers' labor must not exceed the level of workers' wages in the same district or region, because "workers and collective farmers, whose joint labor creates the material wealth of the country, should march in step insofar as the increase in their well-being is concerned." The Plenum recommended that the collective farms make fuller use of their incomes and, therefore, of the differential rent they receive to expand the collective operations and to satisfy the social, cultural and material requirements of the villages by building electric power stations, roads, boarding schools, hospitals, nurseries and so on. In this way, differential ground rent as a definite economic category of the collective farm system is being increasingly used in the building of a communist society.

Footnotes

- (1) Zemel'naia renta v sotsialisticheskome skom khoziaistve, Gosplanizdat, 1959, p. 150.
- (2) Karl Marx, Capital, Vol. III, 1954, p. 8 (Russian edition).
- (3) V. I. Lenin, Collected Works, Vol. XIII, p. 269 (Russian edition).
- (4) Karl Marx and Friedrich Engels, Collected Works, Second Russian Edition, Vol. IV, p. 177.
- (5) I. I. Kozodoev is one of the first Soviet economists who offered a basically correct analysis of the conditions under which differential rent is created under socialism (Zemel'naia renta v epokhu diktatury proletariata, Znanie Publishing House, 1957).
- (6) Karl Marx, Capital, Vol. III, p. 819.
- (7) Ibid., p. 674.
- (8) Ibid., p. 749.
- (9) Zemel'naia renta v sotsialisticheskome skom khoziaistve, p. 233.
- (10) Marx and Engels Archives, Vol. XIII, pp. 88, 121, 147, 151.
- (11) Zemel'naia renta v sotsialisticheskome skom khoziaistve, pp. 47-48.
- (12) Karl Marx, Capital, Vol. III, p. 673.
- (13) Uchenye zapiski Kharkovskogo gosudarstvennogo universiteta. Trudy ekonomicheskogo fakul'teta, 1957, p. 157.
- (14) Karl Marx and Friedrich Engels, op. cit. p. 175.
- (15) Karl Marx, Theories of Surplus Value,

- II, Gospolitizdat, 1957, p. 133 (Russian edition).
- (5) Karl Marx, Capital, Vol. III, p. 720.
- (7) Ibid., Vol. I, 1954, p. 324.
- (8) Zemel'naia renta v sotsialisticheskome sel'skom khoziaistve, p. 48.
- (9) I. I. Kozodoev, op. cit., pp. 14-15; Zemel'naia renta v sotsialisticheskome sel'skom khoziaistve, pp. 25-200.
- (10) Ibid., p. 82.
- (11) Voprosy ekonomiki, planirovaniia i statistiki, Collection of Articles, Academy of Sciences of the USSR, p. 95.
- (12) Zemel'naia renta v sotsialisticheskome sel'skom khoziaistve, pp. 30, 245-246.
- (13) Karl Marx and Friedrich Engels, Selected Correspondence, Gospolitizdat, 1953, p. 483 (Russian edition).
- (14) Before the revolution in Russia bourgeois economists and statisticians estimated that there were not less than 13 zonal markets in which the prices of farm products differed greatly (Stoimost' proizvodstva glavneishikh khlebov, 1915, Part 1, pp. 366, 374).
- (15) Karl Marx and Friedrich Engels, Selected Correspondence, Gospolitizdat, p. 209.
- (16) Zemel'naia renta v sotsialisticheskome sel'skom khoziaistve, p. 128.
- (17) Politicheskaiia ekonomika, Textbook, 3rd Revised Edition, Gospolitizdat, 1959, p. 585.
- (18) Ibid., p. 586.
- (19) Zemel'naia renta v sotsialisticheskome sel'skom khoziaistve, p. 64.
- (20) Ibid., pp. 197, 237, 252.

- (31) Ibid., p. 100.
- (32) Ibid., p. 252.
- (33) Ibid., p. 238.
- (34) Zemel'naia renta v sotsialisticheskome sel'skom khoziaistve, p. 197.
- (35) Karl Marx and Friedrich Engels, Selected Correspondence, p. 27.
- (36) Zemel'naia renta v sotsialisticheskome khoziaistve, p. 203; also I. I. Kozodoev, op. cit., pp. 25-27.
- (37) Agrarnaia politika Sovetskoi vlasti (1917-1918 gg.), Documents and Materials, USSR Academy of Sciences, 1954, p. 137.
- (38) One cannot agree with the opinion of some economists, including A. I. Paskhov, that the content of that Article was not based on the Marxist-Leninist theory of ground rent, but proceeded from the principle of equalitarian land tenure and, therefore, has lost all value today (Voprosy ekonomiki, planirovaniia i statistiki, pp. 101-102; Zemel'naia renta v sotsialisticheskome sel'skom khoziaistve, p. 43). Lenin time and again pointed out that equalitarian land tenure is a concession to the peasantry, but he never said that collection in full of differential rents I and II and their transfer to the socialist state is a similar concession. What Article 17 demanded was not the equalization of the incomes of peasant husbandries, but giving them economic equality and more or less similar economic conditions of production.
- (39) Ibid., p. 106.
- (40) Voprosy ekonomiki, planirovaniia i statistiki, p. 100.

DECREES AND INSTRUCTIONS

Pravda, February 21, 1958

On the Reorganization of the Ministry of Agriculture of the USSR

The Central Committee of the CPSU and the USSR Council of Ministers note that in the last few years much has been done along the lines of reorganizing the management of agriculture.

In pursuance of the Party policy of extending the powers of the Union Republics in the management of the national economy, many aspects of finance, supply and planning that were formerly under the authority of the Ministry of Agriculture of the USSR have been transferred to the republics, whereas questions of distribution of investments, machinery, mineral fertilizers and other material resources among the republics have been referred to the State Planning Committee of the USSR.

A new procedure for the planning of agriculture has been adopted and is being implemented with a view to giving the workers of the countryside incentives to improve the cultivation of land and step up the output of crop and livestock products. The agricultural bodies are no longer required to keep statistical accounts and submit them to the state. This work has been made the function of the Central Statistical Administration of the USSR Council of Ministers and its local branches.

Until recently the Ministry of Agriculture was responsible for the utilization of agricultural machinery and its repair. At present this function, too, no longer comes within the province of the Ministry. A special combined administration for the sale of agricultural machinery, fertilizers and other material and technical items to the collective farms and state farms is being set up. This administration will also deal with the repair and employment of machinery.

Hence, the Ministry of Agriculture no longer has to plan agricultural output, handle accounting and financing matters, organize material and technical supply and repair of the machine and tractor fleet, and exercise operational control over the carrying out of current agricultural assignments. Today, when the collective and state farms have trained personnel of their own, it is no longer necessary for a Union Ministry to give instructions to the districts on carrying out sowing, harvesting and other agricultural operations. Any attempt to revive these functions as ministerial functions would mean a return to outmoded methods which would inflict serious damage to agriculture.

Under these conditions it has been found necessary to reorganize radically the agricultural apparatus, to change it from an apparatus of administrative management of agriculture — as was the case for many years — to an organizational center for the introduction of scientific achievements and advanced experience into farming. Our country has entered a new stage of its development — the stage of full-scale construction of a communist society.

Today a fundamental task in the practical work of the Party and the people is to put into effect on the broadest possible scale the latest achievements of science and advanced experience. Only by drawing on science and the experience of the foremost workers can labor productivity be raised to the level necessary for the complete triumph of communism.

Soviet agricultural science, the foremost collective and state farms, and innovators have demonstrated the tremendous opportunities latent in socialist agriculture. Many collective and state farms in all the republics of the Soviet Union have already reached the level of output necessary for the creation of an abundance of agricultural products in our country.

The main thing now is to popularize the best achievements of science and advanced methods of work among millions of farmers and to have all collective and state farms work like the foremost people in agriculture. The work of the Ministry of Agriculture and its local bodies and the structure of agricultural administrative organs should be such as to make for the achievement of this goal.

In the new conditions the Ministry of Agriculture's principal task is to further improve farming techniques and technical progress in all spheres of agriculture through the development of agricultural science, the greatest possible improvement in the work of research establishments and the generation, dissemination and large-scale introduction of scientific achievements and advanced experience into farming practice.

One of the principal tasks of the Ministry is to organize seed-breeding and selection-breeding to guide experimental agricultural centers.

The Ministry of Agriculture of the USSR must

up problems concerning pedigree breeding, primary problems and questions of combatting diseases and pests.

An important task of the Ministry of Agriculture is the training of personnel with higher and second-school qualifications. It is especially important for students of agricultural colleges and specialized schools not only to acquire theoretical knowledge, but they also be able to apply their knowledge in practice, that they know how to handle machinery, that they acquire other practical knowledge in the course of instruction. For this it is necessary that the agricultural schools be located not in cities, but in rural districts, on the vast state farms.

The Central Committee of the CPSU and the USSR Council of Ministers attach special significance to the reorganization of the local agricultural authorities. So far they have been engaged mostly in office work. Thousands of specialists have been detached to the vital job of organization.

Under present conditions the local agricultural authorities should be mainly concerned with district experimental model farms reorganized from abandoned state or collective farms. The specialists and scientists who are going to do this kind of work should both accumulate their own experience and realize the experience of the other collective and state farms. They should then work energetically to apply this experience at the farms in their respective areas so that higher theoretical and practical standards can be ensured in agriculture. The scientists and specialists of the experimental model farms must make it their particular concern to have the collective and state farms they serve to introduce the best graded seed, pedigree seed, advanced methods of crop cultivation, soil tillage and systems of field fertilization, as well as other measures that will raise labor productivity and reduce production costs.

All this should be done not by issuing directives and orders but by offering substantiated recommendations and giving the collective and state farms practical demonstrations of the most suitable methods of conducting farm operations and of organizing production.

The experimental model farm should be a model in the full and real sense of the word. The collective farmers, state farm workers, collective farm managers, state farm managers, agronomists, zootechnicians, engineers and other specialists should naturally want to visit it, to see and learn about the pedigree livestock, feeding rations, high yield-species of agricultural crops, mechanization of work for another job, and to receive advice on how to do all these things themselves.

The experimental model farm will dispatch specialists to the collective and state farms, where, under the stipulated terms they will help to organize farm operations properly and work for some time to set things going. It must be remembered that instructing people by giving them concrete examples and models is the most effective way of popularizing all that is new.

The reorganization of the work of the agricultural authorities will help to further enhance the role of science and advanced experience in the development of agriculture. It will bring science still closer to life and to farming practice. This will be most important for carrying out the plans that the Party and the government have set for expanding agricultural output.

The Central Committee of the CPSU and the USSR Council of Ministers resolve:

1. To confirm the structure of the central apparatus of the Ministry of Agriculture of the USSR.

2. To approve the model structure of the ministries of agriculture of the Union and Autonomous Republics and the agricultural departments of the territories and regions and the main trends of work of district experimental farms; to instruct the Councils of Ministers of the Union Republics to approve the structure and staff of the republican ministries of agriculture and the territorial and regional agricultural departments, and also the structure and the main trends of work of district experimental farms, taking into consideration the specific features of agriculture in every Union Republic.

The Councils of Ministers of the Union Republics are instructed to organize the selection of experimental farms of scientific and educational establishments as well as state farms and collective farms which will serve as the basis for the organization of district experimental farms.

3. To instruct the Councils of Ministers of the RSFSR, the Council of Ministers of the Kazakh SSR, the Council of Ministers of the Uzbek SSR, the Council of Ministers of the Azerbaijan SSR, the Council of Ministers of the Lithuanian SSR, the Council of Ministers of the Latvian SSR, the Council of Ministers of the Armenian SSR, the Council of Ministers of the Turkmen SSR and the Council of Ministers of the Estonian SSR to transfer higher and secondary agricultural schools of ministries and departments to the ministries of agriculture.

4. To transfer the State Publishing House of Agricultural Literature from the Ministry of Culture of the USSR to the Ministry of Agriculture of the USSR.

5. In view of the changed tasks and nature of work of the Ministry of Agriculture of the USSR and local agricultural bodies, to entrust the functions

formerly performed by the Ministry to the following departments and organizations:

to the State Planning Committee of the USSR —
questions of state farm operation, forestry, the state land balance, analysis of the economic activities and financial condition of collective farms and state farms, analysis of the fulfillment of the current agricultural production plans and the progress of the main agricultural operations and water conservation construction, and the submission of proposals on these questions;

to the Central Statistical Administration of the USSR — preparation of model annual and quarterly bookkeeping accounts of the collective farms and state farms, preparation of model primary documents and accounting records for the collective farms, assistance to the collective farms in the organization of bookkeeping.

6. To transfer the Agrolesproect Design and Survey Organization from the Ministry of Agriculture of the USSR to the State Planning Committee of the USSR.

WLD IN STACK